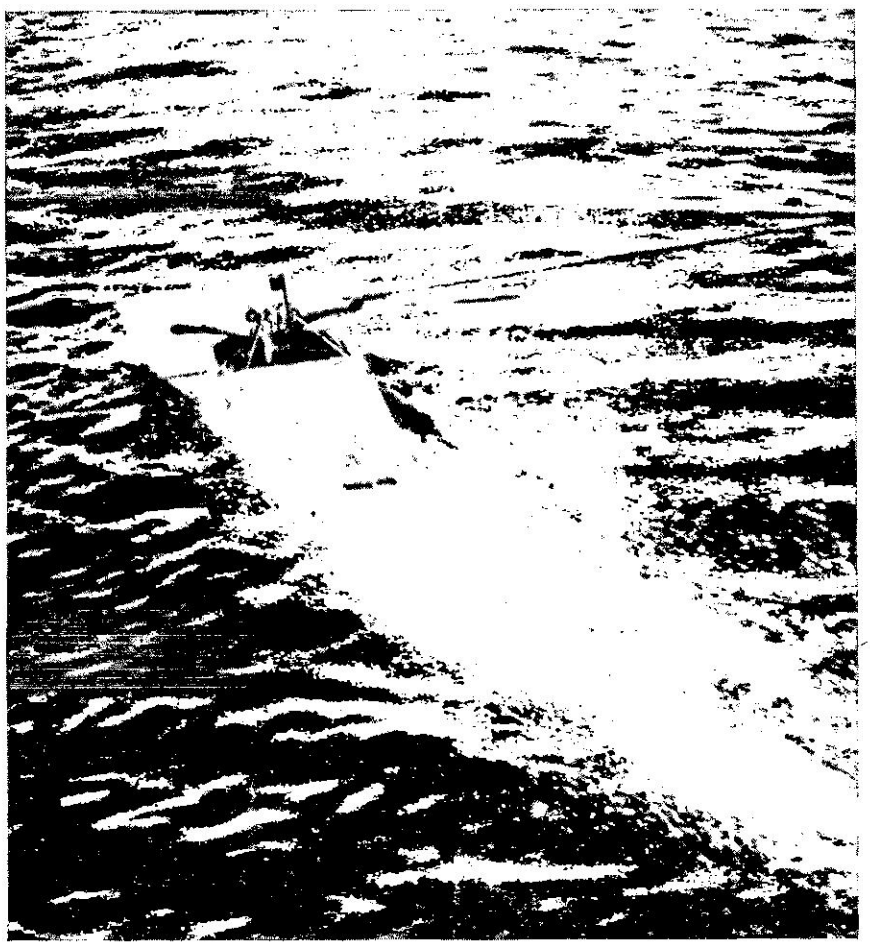
THE MODEL ENGINEER

Vol. 94 No. 2342 THURSDAY MARCH 28 1946 6d



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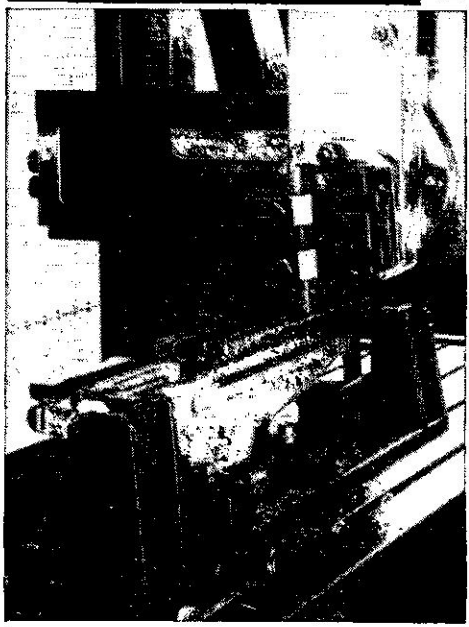

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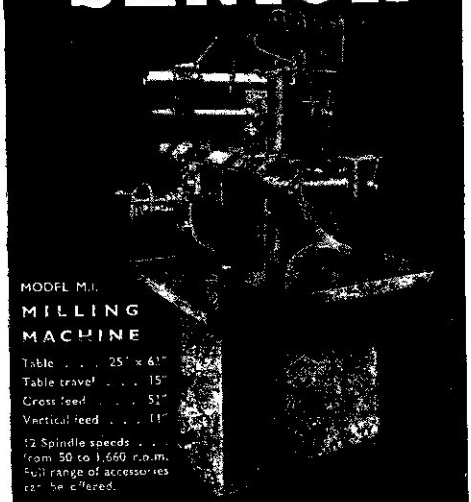

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THE MODEL ENGINEER

Vol. 94 No. 2342 Percival Marshall & Co., Limited Cordwallis Works, Maidenhead March 28th, 1946

Smoke Rings

Cover Photographs

MANY readers have very kindly responded to the recent request for photographs for use as cover pictures. Several of the prints submitted, however, were not of a suitable shape for this specific purpose, though we hope to make use of them in another way. Prints for the cover should be of a shape that will permit the reproduction to be made 4½ in. wide by 5¼ in. high. The original prints may be either larger or smaller than the size stated, so long as the *proportions* are correct.

Mechanics and Mystery

ALTHOUGH I do not usually turn to "thrillers" for my literary entertainment, I was recently persuaded by a friend to read *Mr. Polton Explains*, by the late R. Austin Freeman, a writer of distinction in this specialised field. The plot centres round a mysterious fire in a building in Soho, contrived to destroy all traces of a villainous crime, but different from other fires inasmuch as it proved to have been started by a clockwork mechanism of a particularly ingenious construction. The book, however, has a special interest in the account it gives of the career of a lad who had set his heart on becoming a clock-maker, and who was obviously a born mechanic. He it was who eventually solved the mystery of the fire and proved his theory to the police by the construction of a working model of the mechanism used by the criminal in the case. I think the author of this book must himself have been an horological enthusiast, for he describes very vividly the birth and development of his hero's passion for clocks and some of his experiments in making and adjusting various time-keepers. In particular, he explains in detail the fitting of an automatic calendar to a clock belonging to the lad's employer. All through the book there is evidence of the author's appreciation of good craftsmanship, but I will quote one short passage which illustrates a feeling known to all model engineers. It occurs in the story of the hero's boyhood days when he had succeeded in putting new life into an old family clock which through the dust and neglect of ages had refused further duty. Here it is :—"To all of us, I suppose, there have come in the course of our lives certain moments of joy which stand out as unique experiences. They never come a second time; for though the circumstances may seem to recur, the original ecstasy cannot be recaptured. Such a moment was this, as I sat and gazed in rapture at the old clock, called back to vigorous life by my efforts, I enjoyed the rare experience of perfect happiness. Many a time since have I known a similar joy, the joy of complete achievement (and there is no pleasure like it); but this was the first of its kind, and in its perfection, could never be repeated." As I read this I thought of the many model engineers who have experienced a similar thrill when they first raised steam in their locomotive or other engine and saw the parts actually begin to move. The thrill of complete achievement, so happily described in young Mr. Polton's autobiography. The mechanical enthusiasm of this mystery book added much to my enjoyment.

The Institute of Patentees

I RECENTLY published a request from the General Secretary of the Institute of Patentees for the names of model makers who might be able to do occasional work for their members in connection with the development of inventions. The Secretary now asks me to thank the many readers who have replied, and to say that their names are being classified for locality and special qualifications, and will be passed on to members as required.

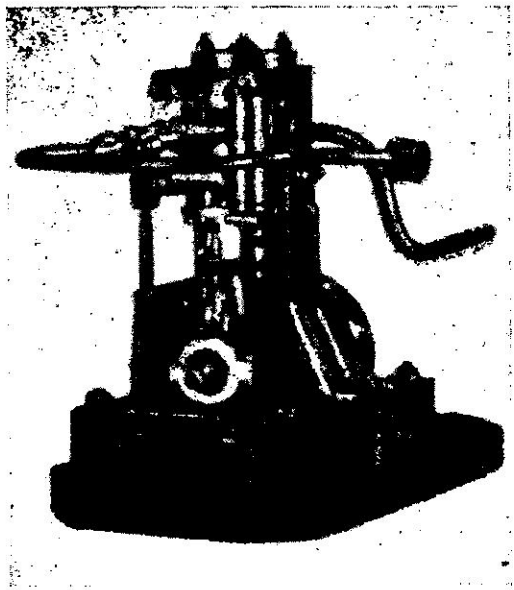
"M.E." Sales

A WEEK or two ago I wrote that the position in regard to purchasing copies of THE MODEL ENGINEER was a little easier, and that intending readers should not have quite the same difficulty in procuring the journal regularly. The small margin in supplies then available has been quickly taken up and once again we are only able to put newsagents and intending subscribers on a waiting list for supplies when more paper is released by the Controller.

Percival Marshall

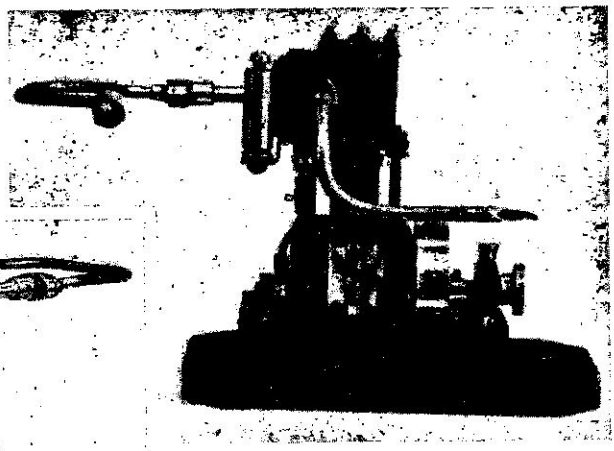
A Simple Marine Engine

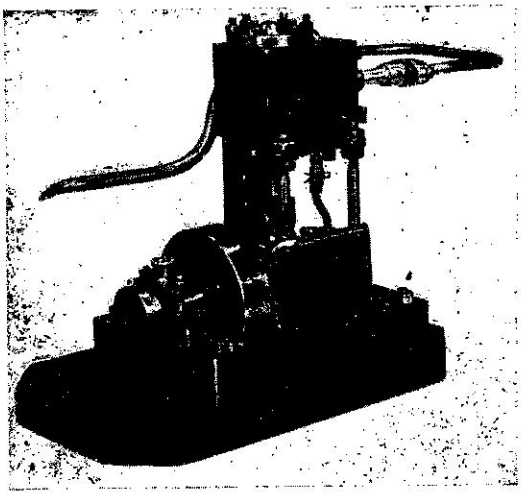
By R. G. WASHINGTON



IN the fourth year of my time as an apprentice marine engineer, after much thought, and many sketches and drawings, I started building a marine engine of the open-fronted type. Starting on the bed-plate, which I machined from a solid block of mild-steel, drilling and filing the pits for the eccentric, flywheel and bottom end. The cylinder was then bored out and lapped—this was of mild-steel—the ports and tapping holes were drilled, and then the valve-chest attempted and finished. The crankshaft was turned out of the solid,

The photographs show three views of an apprentice's first attempt at model making.





complete with balance-weights. Columns, flywheel, crankshaft, cylinder cover, valve-chest and cover, eccentric, crosshead, connecting-rod and eccentric-rod are all of mild-steel. The lubrication is supplied to the valve-chest by means of a displacement lubricator, which is fitted to the valve-chest cover. This engine is five inches high and four inches long.

A Precision Dial Indicator

By A. C. CLARKE

THIS instrument was designed and made by me to fill a need for a dial indicator rather more exact than the ordinary 1/1000 clock.

It has been used regularly for the past two years on work to very close limits in an instrument shop in one of our armament works.

The working principle differs from all clocks I have seen, as whilst the necessary magnification is given by levers, the motion is transferred from the levers to the pointer by a human hair passing round a small drum and kept in tension by a hair spring.

This may at first sight seem very frail, but it must be remembered that the leverage applied is in favour of the hair and the tension is very slight, the principle has the very great advantage of a total absence of stickiness which is the common fault with some indicators; also, it lends itself to easy construction without the aid of elaborate equipment.

The working drawings are to scale for a clock giving readings in 1/0.00025 increments, covering 0.010 in a full turn of the pointer.

Now as to construction: the main casing was cut from solid steel on an Adept shaper to dimensions as drawn, and a brass sliding cover made to fit in dovetails provided with an end-piece fitted and sweated to exclude dust, as shown.

The boss for lever No. 2 was screwed in position; also, a 2-B.A. screw for fixing attachment, these being afterwards sweated together.

The next item was a case taken from a discarded pocket-watch, which should preferably be the type divided in two places with detachable back and front bezels.

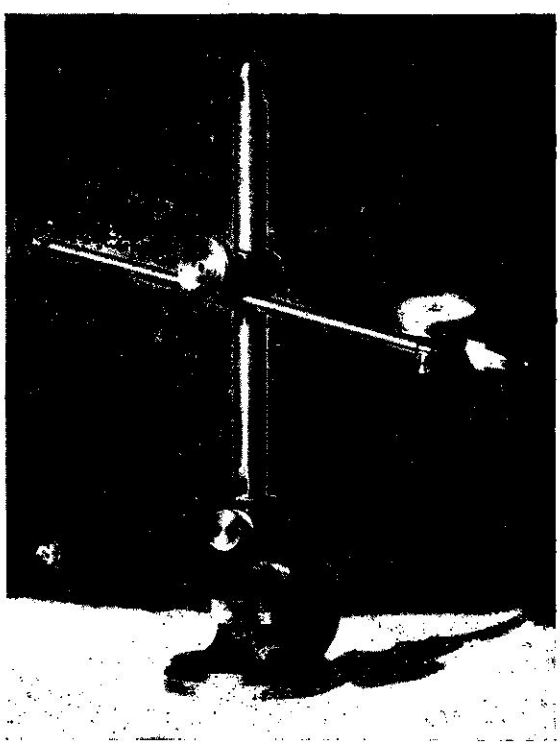
The back of the watch-case is attached to the main casing by two 6-B.A. screws, in the position shown in assembly drawing, and the slot cut to clear lever No. 2 right through both cases.

The inside of the watch-case back was then painted white to show up the hair more clearly when fixing in position.

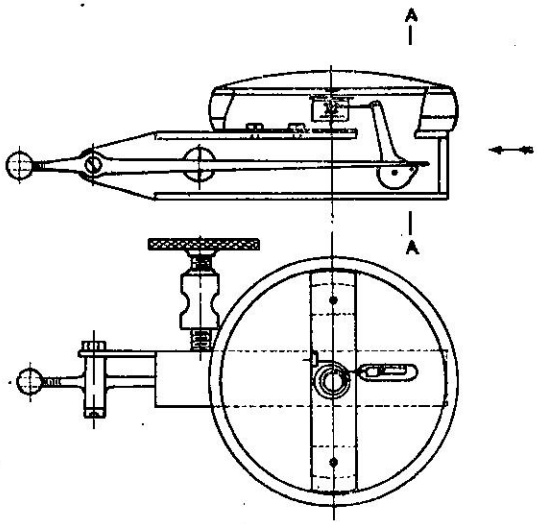
The next item was the centre section of the watch-case, the old sleeve for the winder being removed and the hole plugged; the motion bracket was then made up from sheet metal and soldered to the shoulders in the case originally holding the movement of the watch; remember to fit the small piece of brass to the lower half of the motion-bracket to anchor the outer turn of the hair-spring.

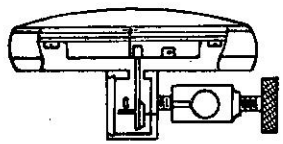
The two levers should now be filed to shape; they give a magnification of 5-to-1 and 6-to-1 respectively, so the total gain is 30-to-1; this means, for a 0.01 in. movement on the contact point, lever No. 2 will move 0.3 of an inch on its outer end, so that the diameter of the drum need not be exact to give a circumference of 0.3 in. The contact ball of lever No. 1 is screwed on the lever, and so it can be adjusted until the hand fitted to the staff rotates exactly one turn when the ball is moved 0.010 in. It is important that both levers fit on their pins without shake and yet be perfectly free. Now remove the hair-spring, complete with centre collet, from the balance-wheel of the watch, and turn the staff to the dimensions shown in drawing, with the centre section turned to suit the collet of the hair-spring. It is very important that the two reduced ends of the pivot run true with the centre section and with each other.

The drum should now be turned and the centre hole drilled to suit the staff; this must also run true. The holes in the motion bracket for the staff are best drilled after the bracket is fixed to the case, when it can be marked-off in the centre of the watch-case; at this stage,

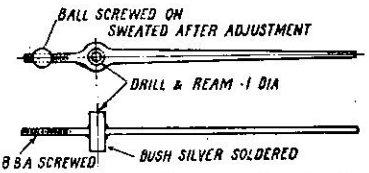


Ready for use. Note rigid stand

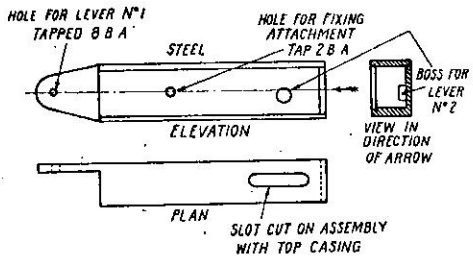




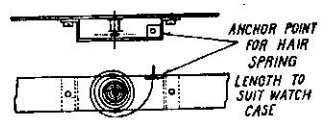
SECTION ON A A FROM ARROW



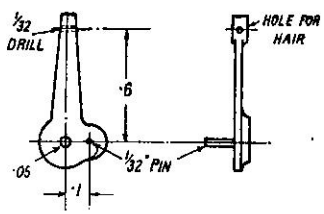
Lever No. 1 (lever, steel; bush, ph. bronze)


HOLE FOR LEVER N°1 TAPPED 8 B A
STEEL
HOLE FOR FIXING ATTACHMENT TAP 2 B A
BOSS FOR LEVER N°2
ELEVATION
VIEW IN DIRECTION OF ARROW
PLAN
SLOT CUT ON ASSEMBLY WITH TOP CASING

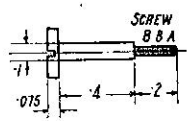
Main casing (steel)



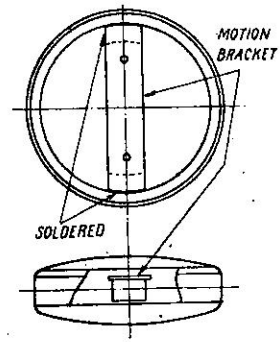
Motion bracket with lower bracket, hair-spring and drum



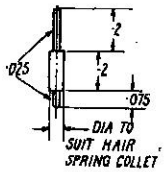
Lever No. 2 (ph. bronze)



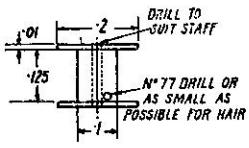
Pivot screw for lever No. 1



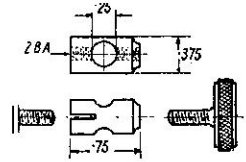
Case taken from old watch



Staff (silver-steel)



Drum (brass)



Fixing attachment (steel)

a disc of brass should be cut the size of the original watch-dial, drilled 0.125 in. in the centre and screwed in position on the motion bracket, which can now be removed for engraving.

The method of engraving the dial was to turn a stub-mandrel in the lathe, solder the dial to it, re-chuck with a 40-tooth wheel on the tail-end of mandrel, with a locking indent, and cut forty lines or divisions on dial with a V-point tool on its side in slide-rest, noting the position of handle each time to ensure the lines being the same length; then passing round again cutting every fourth line twice the length. These lines were then stamped 0 to 9, and the dial was enamelled, the lines being filled in with wax.

The indicator, showing dial

The pivot-screw needs no detailing, except to state that the bearing portion must be parallel and polished; the fixing attachment is rather like an old-fashioned terminal, the parts should be turned from steel; after turning, the centre section should be slotted with a hack-saw and closed down slightly in the vice to grip the screwed portion that is fixed to main casing.

To assemble and adjust the indicator, first screw the watch-case to main casing and fit 0.05-in. steel pin in centre of boss provided for lever No. 2; then insert No. 2 lever into position. If necessary, adjust the length of slot through both cases to allow the lever just over 0.3 in. of free movement; next, fit lever No. 1, adjust pivot screw until lever moves perfectly free, without shake in any direction, and presses on pin in lever No. 2 without fouling lever. When this is done, slide the dovetailed cover in place on main casing, to protect levers whilst assembling the remainder.

We next assemble the hair-spring and drum to the pivot, as shown, and fit complete to motion-bracket pegging the outer coil of hair-spring in anchor point with a small piece of brass wire tapered and filed to suit.

The pegging or fixing of the hair calls for a deal of patience; first, make two little pegs from close-grained hard-wood to suit the holes in the drum and lever No. 2; then, in a good light, peg the hair into drum and snap centre section of case on to back. Human hair varies a lot in colour, and it is preferable to get a dark shade, as this shows up better against the painted back-ground of the case. Next, pass the hair twice round the drum and put the free end through the hole in lever No. 2, with the lever in forward position nearest to drum, and fix hair to lever with prepared peg.

Now screw the dial in position and fit a minute-hand (taken from watch) on centre pivot; if necessary, bush the hand to suit. Next, snap on top cover of watch-case, taking care to see that the hand does not touch either the glass or the dial.

The final job is to adjust the readings; to do this, fix the gauge firmly on a stand or in a vice so that it cannot move, and clamp a micrometer in such a manner that the anvil of the "mike" makes contact with the contact-ball. Now, moving the mike 0.010 in. should move the hand exactly one turn; if it is less, screw ball further on to lever No. 1; if too much, unscrew ball. When set, remove No. 1 lever and secure ball with a small spot of solder in thread, polish and re-assemble.

Note.—This indicator is very sensitive; therefore, it is advisable to use a good solid stand that is free from spring or shake, or the readings will not be accurate.

Kodak Society of Experimental Engineers and Craftsmen

On Saturday, January 26th, some thirty members of the K.S.E.E.C. joined forces with an almost equal number of members of the Harrow Society of Model Engineers, and, together we "invaded" the British Thomson-Houston Company's works, at Neasden Lane.

After being welcomed on behalf of the management of Messrs. B. T.-H. Ltd., the party was split into small groups and taken on a tour of the main workshops. Here we saw enough to convince us of the thorough organisation necessary in a big electrical concern like this. From the well-fitted-out machine shop we saw various electrical assemblies in different stages of construction—some large, others smaller.

The high-light of the visit was a demonstration of high-tension voltage testing in the laboratory. We witnessed first the testing of an insulator for a pylon with voltage up to 450,000, then the effect of rain on an insulator, and, finally, a test to find the effects of a lightning surge on another insulator of similar type, This proved to be the most interesting of all—a surge of approximately 750,000 volts being recorded.

*A CONGREVE CLOCK

By Dr. J. BRADBURY WINTER

Details, dimensions and instructions for making an attractive timepiece

THE framework of the case may be made of well-seasoned pine, free from knots. The flooring should be solid and thick, not less than an inch and a half, in case the weight line should break. I always put, in all my clocks, a square of felt, 1 in. thick, in the "line of fire" as a further precaution; this is wrapped in newspaper to keep moth away, and then covered with brown paper for neatness.

The four pillars (2-in. square "stuff," which finishes 1⅞ in.) are firmly held below in a wooden box, 3¾ in. high × ¾ in. thick. This is plated with mahogany or oak, 5½ in. × ½ in., which covers the edges of the floor board and extends ¼ in. above the "box" to form a groove all round for the panels to rest in. (See Fig. 25.)

The tops of the pillars are similarly braced together by a "cornice" 3¾ in. wide × 1¼ in. thick; but in this case it is mortised into the pillars flush with their inner surfaces, leaving a space ⅝ in. deep between them on the outer side, which is utilised for the side panel catches.

The top frame, 18½ in. × 18 in. × ⅞ in., with a moulding all round, is screwed to the "cornice," and another frame, 15 in. × 14½ in. × ⅝ in., is laid above it, hiding the screws, and fixed by screws with their heads below. This upper frame fits inside the glass case. The aperture in both frames fits the rebate round the under side of the base on which the plummer blocks rest, and from which the "movement" is hung. The upper cornice is not shown in the drawing.

The front and back panels rest in the groove below, lying flat against the pillars and held to them above by a 2-in. length of 1-in. angle-iron screwed to them; these are placed with their top edges 12 in. from the top of the panels.

A square frame, 14¼ in. × 14¼ in. × ½ in., is fixed outside the front panel by four screws with heads at the back, placed to correspond with the circular moulding round the dial, which enables longer screws to be used, and also helps to hold the moulding to the square frame; this has a bevelled edge on three sides, but the top edge is left square.

Fig. 26 is a sectional view of the square frame and circular moulding, showing also the dial and bezel and glass. The method of fixing the dial is shown in Fig. 26. Four strips of brass, 2⅛ in. × ⅜ in. × ⅛ in., are attached to the dial on the diagonals by 6-B.A. screws, which also hold the bezel. Two wood screws hold each strip to the panel. It is unlikely that the back of the dial will come exactly flush with the back of the panel, and washers may be needed to make up the difference. It should be noted that the 10¾ in. circular aperture in the square frame has a rounded edge to form part of the moulding.

The side panels are removable. They rest in the groove at the bottom, like the others, but are held at the top with a catch (Fig. 27). A ⅜ in. round steel rod has a "double-eye" screwed on one end (2-B.A.) to engage with a projection riveted on the catch lever which lies flat against the cornice in the ⅜-in. space behind the panel pivoted on a round-headed wood screw in the cornice, 1¼ in. from the panel centre line, and 2 in. below the top. The double-eye pin is slightly tapered to fit tight in the projection, but loose in the double-eye. A metal-disc, ¾ in. diameter × ⅛ in. thick, is riveted at the end of the lever as a counter-weight.

The double-eye rod passes through a ⅝-in. clearance hole in the pillar, and a ⅜-in. hole in the back panel, broached as required to give the rod complete freedom. The rod projects ⅛ in. from the back of the panel, and is not noticeable to the eye, but easily felt. A slight pressure with a finger raises the snout of the lever to release the catch, and the spring-loaded thrust lever (Fig. 28) pushes the panel outwards, "hinged" in the bottom groove. To allow it to do this without risk of breaking the outer edge of the groove, the inside surface of the panel should be slightly bevelled along the bottom edge. The thrust lever spring must be fairly strong, about ½ in. diameter outside, and made of piano wire about 63/1,000 in. thick. Two positions of the lever are shown, full lines when the panel is closed, dotted lines after thrusting it out. The "buffer" on the panel is made of bent strip mild-steel, 1¼-in. wide × 1/16-in. thick. It will bend much more evenly if firstly annealed.

The catch on the panel which engages with the snout of the lever is shown in Fig. 27. The notch must be filed carefully until the lever just snaps into it without undue play. When closing the panel, a most satisfying sound is produced as the weighted lever falls on the fibre "stop."

The clock stands on four feet resting on 2 in. squares of three-ply wood. A piece of metal, about 2 in. × ⅜ in. × 5/16 in., is let in flush with the under-surface of the floor board near each corner, and held with two screws. In the centre of the metal pad a hole is drilled and tapped 5/16-in. Whitworth. A hexagon-headed screw, 1 in. long, goes into the hole with its head below, to rest on one of the plywood squares. The clock can thus be levelled in a few minutes with a spanner. A clearance hole must, of course, be drilled in the wood to allow the screw to protrude above the metal pad.

When levelling, first get it right from side to side, so that the ball rolls at the same speed in either direction; then adjust the "fore and

* *Continued from page 277, "M.E.," March 14, 1946.*

aft" level by noting the speed of the ball, finally timing it on its journeys across the plate with a watch or clock.

That part of the automatic electric winding mechanism which is included in the "movement" may now be made. It is clearly shown in the "general arrangement" drawings, Figs. 6 and 7. This arbor, pivoted in plates "B" and "D," is of unusual length and is, therefore, $\frac{5}{16}$ in.

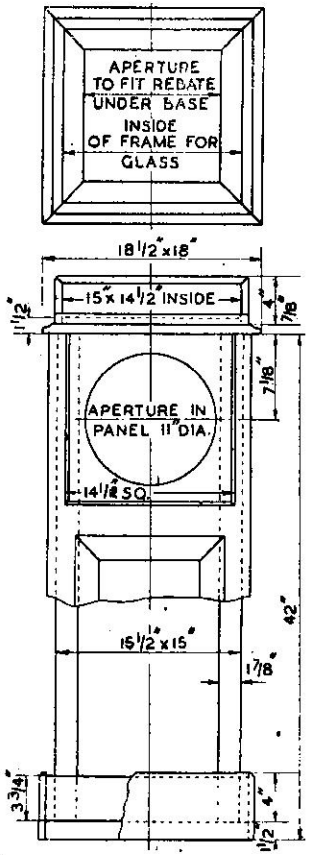


Fig. 25. Front view of case, with plan of top

diameter, instead of our standard $\frac{1}{4}$ in. It passes through plate "C" without touching it, a hole about $\frac{3}{8}$ in. diameter giving good clearance. A 20-wheel gears with the 95 on the weight-line barrel, and mitre wheels convert the rotation to a vertical shaft rotating in angle-iron brackets bushed with brass and fixed to plate "B," as in the similar case described for the transmission gear to the hands.

One essential point must be observed. In Fig. 7 the dimension of $\frac{1}{2}$ in. is given for the centre of the vertical shaft from the centre of the clock. It must not be less than this, otherwise the shaft which ascends to carry the solid portion of the clutch will not clear the horizontal hands arbor which it crosses lower down.

The clutch (about 2 in. diameter) is bored to a taper with the slide-rest set over to 9 deg. It is a good plan to make the solid portion immediately after the hollow part without altering the set of the slide-rest; they will then both have the same taper, provided that in each case the tool was exactly on the lathe centre for height. This is very important; any variation in height will upset the taper.

The solid portion is bored to fit reasonably tight on a brass tube of stout gauge $\frac{9}{16}$ in. external diameter, shouldered down to about 17/32 in. where it fits into the cone. The cone may be bored to this diameter now, but the tube will be dealt with later. Allow $\frac{1}{8}$-in. clearance between the top of the solid portion and the end of the bore in the hollow part. An end-thrust ball-bearing lies between the boss of the clutch and lower angle bracket. I bought many of these before the war for different purposes. They were made with various bores, but all had $\frac{1}{8}$-in. balls in a gunmetal cage between hardened steel discs $\frac{1}{16}$ in. thick, the overall thickness being, therefore, $\frac{1}{4}$ in. I found them excellent in use, and very cheap.

Having got the dial fixed, the pillars which hold the lower bearing for the hands arbor mitre wheels can now be made to the corresponding length. (See Fig. 7, and letterpress in the issue of February 28th.)

Fig. 7 also shows the very small clearance, 1/32 in., between the rocking lever and the

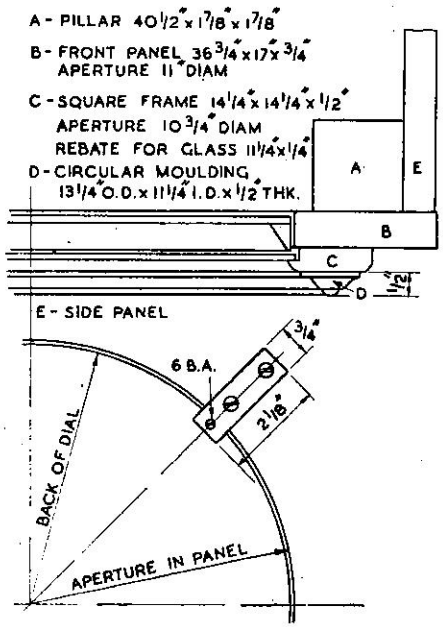

A - PILLAR 40 1/2" x 1 7/8" x 1 7/8"
B - FRONT PANEL 36 3/4" x 17" x 3/4"
APERTURE 11" DIAM
C - SQUARE FRAME 14 1/4" x 14 1/4" x 1/2"
APERTURE 10 3/4" DIAM
REBATE FOR GLASS 11 1/4" x 1/4"
D - CIRCULAR MOULDING
13 1/4" O.D. x 11 1/4" I.D. x 1/2" THK.
A
E
B
C
D
1/2"
E - SIDE PANEL
3/4"
6 B.A.
2 1/8"
BACK OF DIAL
APERTURE IN PANEL

Fig. 26. Sectional view of square frame and circular moulding, showing also the dial, bezel and glass. Method of fixing the dial to the front panel

upward projection on plate "A." This must now be attended to; if there is too much clearance here, there will be too little in the plummer block. It is a matter of adjustment of the rocking pivots. Assemble the four main plates on their

pillars. Get the rocking plate hung on its pivots and adjust them until the clearance is correct, using a feeler gauge of some kind ; a 6-in. steel rule is often 1/32 in. thick, or a suitable piece of silver-steel wire may be found. When the plate is in its proper position, the outer ends of the pivot shells with the screw-driver slots must not project more than about 1/64 in. from the plates. If they do, they must either be shortened slightly, or the countersinks in the trunnion and lever may be enlarged. If, on the other hand, one or other is found to be below the surface of the plate after adjusting, that is of no consequence. These pivots have to be removed every time when assembling ; it is important, therefore, to have a written note about their exact position. It makes no difference which pivot is noted, so you may choose the one most easily described. For example, it may be found that the back of one shell happens to come just flush with the plate ; that would be very simple to notify. But it is advisable also to put a centre-pop on the back of the chosen pivot, not only to show that this is for plate " A " or plate " D," as the case may be, but the precise location of the centre-pop is to be noted (top, bottom, right or left of the centre when viewing the end of the shell). If a careful note is made of these particulars, there will be no difficulty when assembling ; this special pivot is firstly adjusted according to the instructions, and then the other pivot is screwed in until end-shake is only just perceptible.

Another detail must now have attention, the fitting of the plummer blocks and steel plates on the long studs. Remove the rocking plate, and see if the plummer blocks slip loosely over the studs. If not, it may be because the holes are too small and need broaching, or because the studs are not parallel and upright, and require a gentle tap with a hammer and a wooden punch.

When the complete " movement " is being assembled for the first time, note carefully whether the plummer blocks lie truly parallel with the ends of the rocking plate ; whether they are quite loose and free when the nuts on the long studs are slacked off ; and whether they just lightly touch the ornamental collars, without bearing against them. If wrong in any particular, rectify the fault again with a hammer and wooden punch against the plummer block itself An emery stick makes a convenient punch See also if the thickness of the wood base i such that the centres of the rocking pivot coincide with the centres of the plummer blocks

When making complicated pieces of mechan ism, such as my interlocking calendar, whicl some readers may have seen or heard of, always make a list for assembling, withou which I should waste a terrible lot of time b forgetting some piece which ought to have gon in at an earlier stage. This Congreve clock is of course, by no means complicated, it is comparatively simple mechanism ; none th less, I am going to give the list for assembling and hope it may be found so useful that reader will form the habit of doing this, and in year to come when making something really compli cated they will bless their old friend. Whe taking down, the list can be followed backwards and in that way, perhaps, you may be save from the disaster of removing one of the plate without first letting down the maintainin spring. Many years ago I experienced a thi disaster in removing the fly of a large musica box, so I know what I am talking about!

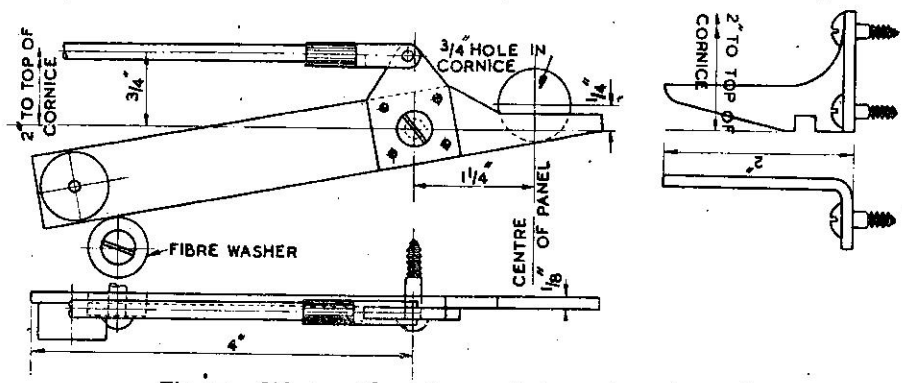


Fig. 27. Side panel catch-lever and the catch on the panel

Assembling

Take plate " B " and fix on it—

Pillars ; remembering that they are numbered

Clutch angle brackets, with mitre wheel ball-race and hollow cone complete.

Bobbins.

Westinghouse M3 Unit.

Stop and spring pins for armature.

Lay the clock on the bench with the pillars vertical and plate " B " below.

Enter the third arbor in its pivot hole in plate " B " ; this pivot hole is near the armature spring pin.

Take plate " C " and fix on it its bridge plate. Thread it over the pillars and put on the nuts.

Take that portion of the maintaining arbor which has the spring barrel, pass it through the large hole in plate " C " and through the bridge plate ; thread it through its 95-wheel and enter its pivot in plate " B."

Pin on its 95-wheel. The larger end of the tapered hole in the bush can easily be seen, but the pin should be tried in the arbor to find for certain which way it goes in this. This

caution is to be remembered in all similar cases.

Insert the other portion of this arbor, with its loose disc and ratchet wheels on it, and engage the spring with the hook on the arbor.

Put in the click for the large ratchet wheel, and adjust its spring.

Lay the other clutch mitre wheel in place on plate "B." Thread its arbor through plate "C" and the mitre wheel, enter its pivot in plate "B" and pin on the mitre wheel.

Put in the barrel arbor, with weight-line attached.

Slip plate "D" over the pillars and put on the nuts.

Now turn the movement over, with plate "D" below. Thread the fourth arbor with wheels pinned on it through the clearance hole in plate "B," and enter its pivot in plate "C."

Assemble the fly pinion in its plates, and fix this complete unit on plate "B" with the short pillars. Armature, with its spring; and hook the spring on its pin.

Put in the crankshaft complete with accessories, 20-wheel, large wheel for fly, two-spoked lever, and eccentric, but not the crank disc.

Take plate "A" and fix on it its bridge plate; slip it over the pillars and put on the nuts.

To Put on the Rocking Plate

First remove the pivot screws.

Remove the fibre pad from the rocking lever, but take a look at it to see how to replace it.

Prop up the wooden base on books, to form a bridge, top side up.

Slip the lower half of the right-hand plummer block over the rocking lever right up to the trunnion, and then slip on the steel base-plate.

Replace the fibre pad on the lever, together with its earth wire, but the long screw with the three wires must not be put in.

Pass the lever and wire through the slot in the wooden base, letting the trunnion rest on the plummer block, with its steel plate on the wood.

Now put in the omitted screw in the fibre with its three wires.

Put the other plummer block and steel plate on the wood under its trunnion.

Prop up the plates and movement in normal position.

Lift the wooden base off the books, with the rocking plate and plummer blocks, and lay it on the plates, guiding the studs through the holes in the steel plates and plummer blocks.

Put in the pivot screws; firstly the one with the centre-pop, to its correct position, then the other, adjusting it until end-shake is barely perceptible.

Put on the nuts which hold the lower halves of the plummer blocks.

Turn the movement upside down on books arranged so that it bridges across them, taking care that the books do not touch the rocking plate. Put on the four hoops securing the wooden base to the pillars, remembering that they are numbered.

There is no need ever to remove the crank from the connecting-rod, nor the screw pin at its upper end.

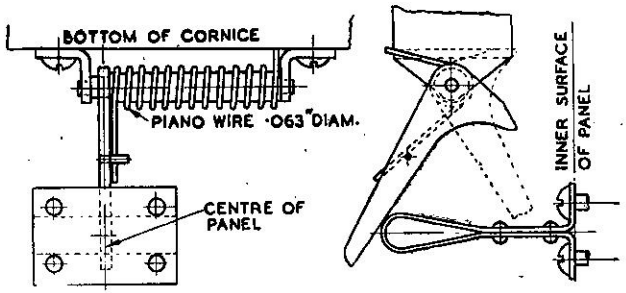


Fig. 28. Thrust lever on bottom of cornice and buffer on side panel

Treating these as one unit, slip the screw through the slot in the rocking lever. (N.B.—The connecting-rod is on the inner side of the rocking lever.) Do not put on the washer and nut at present.

Slip the crank disc on its shaft, turning the disc until its set-screw corresponds with the hole in the shaft; the key will then also correspond with the key-way.

Push the disc on as far as possible, pressing hard with the fingers, then tighten the set-screw.

Now slip the washer on the screw at the top end of the connecting-rod and put on the nut.

Connect the wires to their lower terminals, the heads of the screws being easily reached through the holes in plate "A." The two wires to the transformer (or battery) should be on the far side of plate "B" in the middle compartment. The right-hand lower terminal has two wires in the outer compartment, for bobbins and M3 Unit, and one in the middle compartment for the transformer. The left-hand terminal has three wires in the outer compartment, for bobbins, M3 Unit, and fibre pad on rocking lever. The top terminal has one wire in the outer compartment from the rocking lever (earth) and one in the middle compartment to the transformer. Now turn the movement back to normal position.

Put the imitation shaft-ends in the plummer blocks, and put on their caps, holding the ends with a magnet while tightening the nuts. The nuts on the bases must be left permanently slacked off a quarter turn, leaving the plummer blocks quite loose and free.

Fix the angle bracket, complete with pillars and mitre wheels, on plate C.

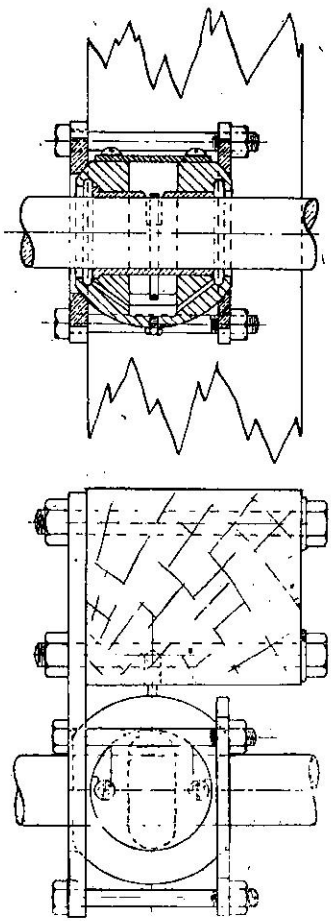
Important.—When taking down the "movement," be sure to remember to let down the maintaining spring, either by pressing on the tail of the click while unhooking the weight in the case; or by gripping the loose disc "K" which carries the click for the smaller ratchet wheel, and allowing it to slip quietly through the fingers while pressing on the tail of the other click.

If, when running, there is any spark between the ball and the terminal inclines, it may be because the poles have got reversed; try the effect of changing the transformer wires to the opposite terminals.

(To be continued)

A Ring-Oiler Type Bearing

THERE have been several types of bearings described in these pages suitable for light shafting ; but not one really appealed to me as combining the three virtues of a good bearing. The virtues I had in mind, at the time, were :—(1) Self aligning ; (2) ring-oiling for least attention and silence ; (3) construction requiring only lathe, driller and bench tools.

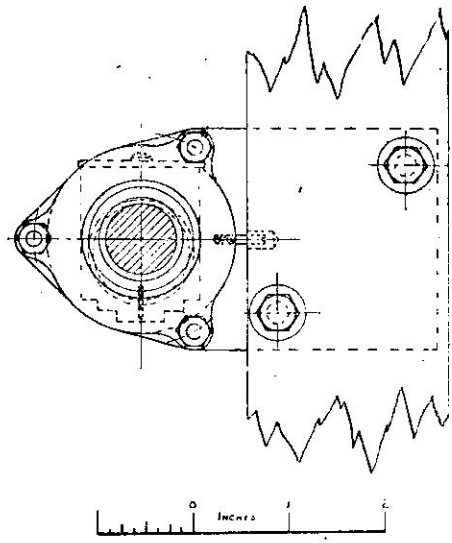


As "necessity is the mother of invention," I had to design my own bearing, and the sketch shows the result. My piece of shafting was a 4-ft. length of $\frac{3}{4}$-in. bright drawn, reasonably straight, and two bearings appeared to be ample for the duties required.

The first items to be made were the two spherical bodies, and, having a piece of 2-in. diameter duralumin rod in the scrap-box, this was set up in the self-centring chuck and turned spherical by means of an improvised lever-operated radial tool-post pivoted under the centre of the ball. At the same setting, the ball was faced, bored for the bush and counter-bored for the oil return groove at one end, then parted-off.

The second ball was then completed as far as the first, and then both were faced and counter-bored on the parted-off faces by mounting on a stub-mandrel held in the chuck.

Facing the balls for oil-well covers was a



simple job, using an angle-plate bolted to face-plate and job bolted through the bush-hole. Milling the oil-well entailed clamping the ball on to the cross-slide table with the bush-hole vertical and suitable packing underneath to bring the centre of ball on to lathe axis. A $\frac{3}{8}$-in. drill held in headstock chuck was used to rough out the slot, after which a $\frac{1}{2}$-in. Morse taper shank end-mill completed the well.

The bushes, oil rings and cover screws were straightforward jobs, but I did forget to put the ring in position when pressing the bush into the second ball, and had partly to withdraw the bush to remedy this omission.

Supporting sideplates were cut from $\frac{3}{16}$-in. thick brass plate, drilled, bored and counter-bored with the aid of the radial tool-post to form the spherical seatings. The smaller retaining-plates were cut from $\frac{1}{8}$-in. thick brass plate and machined in the same manner as the supporting plates, excepting the holes for the clamping bolts, which were tapped.

Three $\frac{3}{16}$-in. B.S.F. bolts were used to tie the plates together and, after adjusting for a very light grip, were locked by lock-nuts.

These bearings have been in constant use for the last two-and-a-half years, and although replenished with oil at about three-monthly intervals, still show less than six thousandths clearance on the shaft.—F. A. SULLEY.

A Finished "Petrolea"

By "L.B.S.C."

AS I have not yet completed the drawing of the inside cylinder for "Hielan' Lassie"—I would rather make the cylinder than draw it, any day, and probably do it quicker, at that!—let's have a few words on the contents of some of the letters that have recently landed on my doormat. The first photograph of a finished "Petrolea," made to the instructions recently given, has duly arrived, the engine being the handiwork of a Liverpool reader, Mr. P. Morgan. Work on it was commenced in April, 1945, and completed in February, 1946, which is pretty good going for a first attempt. The castings were supplied by Dick Simmonds, and were very satisfactory; our friend says he had no trouble in following the instructions, though he managed to get a few of the initiate's usual worries, such as breaking a tap in a deep hole, making one or two scrap parts, and discovering a few Welsh vegetables in his first attempt at boilersmithing. However, difficulties are made to be overcome, and everything turned out all right in the end; the engine will tick over like a clock at only 5 lb. pressure. Mr. Morgan painted the engine as I suggested in the notes, and says the lettering proved much easier than anticipated; he rounded off a good job by taking the photograph himself. Judging by the picture, the little locomotive is not only a very creditable first attempt, but a worthy representation of the full-sized engines; and last but not least, a shining example to other beginners.

A Question of L.S.D.

During the past few weeks I have received about twenty letters from ex-Servicemen and suchlike, enquiring as to what prospects there might be for anyone who wants to make a living at building and repairing little locomotives. As demobilisation proceeds, and great minds still think alike, maybe a little dissertation on this subject will save time, paper, and ink, both to prospective querists and your humble servant. The majority of the writers have merely the usual home workshop kit, consisting of a lathe, drilling machine, and a fair selection of hand tools; and are apparently under the impression that they have only to get some castings and material, build the engines, and sell them. Sounds all right, but there is a bit more in it than that!

First of all, my own experiences may be of interest. Although I have never actually set up as a "professional" locomotive builder, I have done quite a number of "friendly" jobs in the days gone by; this was the direct result of old "Ayesha's" confounding of the critics at the Caxton Hall, and the start of the "Live Steam" notes in this journal. No sooner had they appeared, and it became generally known that I could build 2½-in. gauge locomotives that could make steam whilst hauling a living load and feeding their own boilers, using coal as fuel withal, than requests began to roll in from readers of this journal. Some wanted to buy my old Atlantic, or would I build one like her for sale, or build one of their pet type to give equivalent performance. Others who owned commercially-built engines of the "poison-gas" variety, wanted to know if I would convert their glorified toys into "real" engines. Yet others who had bought specially-made professional jobs, wanted me to overhaul the locomotives and make the necessary alterations for passenger-hauling.

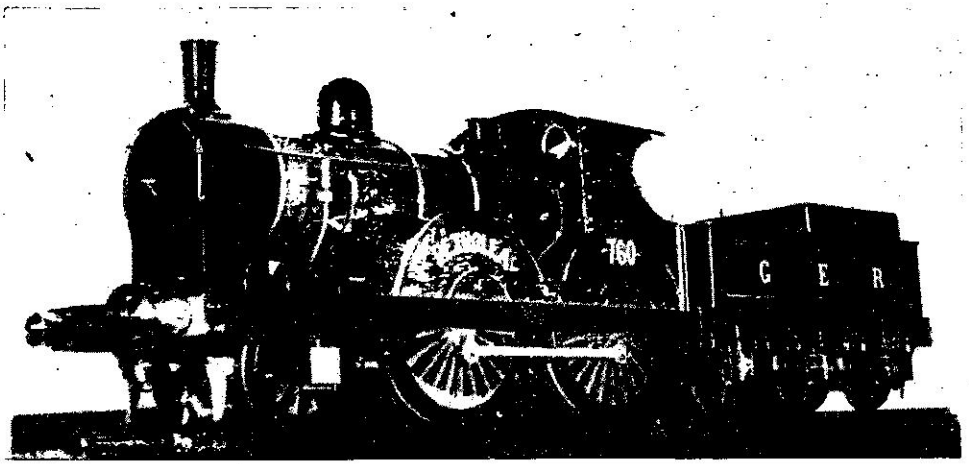


Photo by] [*P. Morgan*

"Streamliners, eh?—I'll show 'em the way to Yarmouth!"

Grist to the Mill

At that time I had no regular employment. Leaving the steam road in search of a bigger pay check—*the* great mistake of my life—I had gone as a motorman on the Underground, to get experience in electric traction; not because I liked it, but for the reason stated above. I figured there might be a chance of an "official" job with a good salary later on. Nature, however, said nay; the Underground air nearly killed me after a life in the open, and on the advice of the company's doctor, I resigned. After that I did a bit of motor testing, and later became travelling inspector for a transport firm; I told about one or two funny incidents connected with that, in my reminiscences. Just before starting these notes, the firm I was then working for, had a bad attack of the "economy fever," and pruned its staff to bare necessity; as one of the last-comers, I was one of the first to go. Well, when the before-mentioned requests began to roll in, I thought I might as well try to earn a bit in my own workshop until such time as I found regular employment again. To that end, I accepted a few commitments from people I actually knew, for two or three new locomotives, and several re-builds and overhauls. I only had a pedal-driven lathe, hand-drilling machine, hand planer, and some hand tools, and an upstairs room as a workshop; but I was over twenty years younger then, and have always been a fast worker. Not having to stop and think over every detail, and needing no drawings, I could go ahead with the regulator wide open and the lever down in the corner, so to speak, and so got busy. The upshot was, that I found my total weekly earnings, from the bit of locomotive work, and my writing, slightly exceeded what I would have earned as a main-line engineman, had I stayed on the railway, though I worked much longer hours; so I was content, and abandoned the idea of searching for outside employment.

But I was sad at heart, longing for the steel road, and the smell of hot oil and coal smoke, and the feel of living metal under my feet; so when I heard there was a chance of an engineer's (that is, driver's) berth on one of the U.S.A railroads, I sold my home and belongings, and crossed the big pond. Alas! Fate once more gave me the proverbial "kick in the pants"; the depression of 1929, plus other circumstances which I need not detail here, put "paid" to that hope, and I returned to this country in the end, downhearted and dispirited, to carry on where I had left off. There was, however, a surprise in store, for as we came off the platform at Waterloo, after the arrival of the boat-train, somebody grabbed my arm. It was the representative of another technical journal, who wanted me to write for them also. I went to their office next morning and fixed up for a series, which is still running; but owing to the onward march of anno Domini, my "literary" speed has slowed down, so that writing and drawing is now practically a full-time job, which just pays my way. I set up a new home and workshop alongside the railway where once I earned my daily bread; my old mates said that I couldn't leave the old line, but would come home and die beside it, and that very nearly came true in the 1940 blitz, and again in 1944, but Providence willed otherwise.

A Newcomer's Chances

In view of my own experiences, let us do a little analysing and see what sort of a chance an unknown newcomer to the craft has of earning a reasonable living. In most trades there is a sort of "basic" hourly rate (2s. 3½d. in the building industry, for example) so we will say our locomotive builder aims at 2s. 6d. per hour and works an eight-hour day, with a "full" Saturday, and Sunday off for rest, which figures out at £6 per week.

Now consider a 2½-in. gauge locomotive of the "Live Steamer" class, with a coal-fired boiler, and the general construction as specified in these notes. If the builder is a good and speedy workman, he should be able to make an Atlantic or 4-6-0, engine and tender complete, in ten weeks, using the ordinary kit found in a home workshop, same as I had at Norbury, and mentioned earlier in this dissertation. Castings and material would cost roughly £5, if bought at the right places. Incidentals, such as fares when gathering materials, postages, and oddments such as a steam-gauge which it would hardly pay to make at home, would probably run into a similar amount; so that to get a "mechanic's wage" for his labour, he would need to charge £70 for the engine. IF he could find a customer every ten weeks who would be willing to pay the sum mentioned to an unknown (for the time being, anyway) locomotive builder, he would be assured of a reasonably comfortable living; but that is the rub!

Larger engines would work out in like proportion. I doubt if anybody could make a real good guaranteed job of a 3½-in. gauge "Bantam Cock" 2-6-2 in less than 25 weeks with the outfit mentioned, and with materials and incidentals, the selling price would be about £180 if the "basic wage" is to be maintained; whilst an engine like "Hielan' Lassie" would have to fetch £250 at least. For these prices, the customer would expect very high-class work, naturally; and I wonder how many of the aspiring locomotive builders could do that class of work in the time specified? A steam locomotive cannot be assembled in the same way as a radio set, or one of those clockwork or electric toy engines for which kits of parts are sold; it needs skill and patience. I know, because I've "had some." Two or three of the querists first mentioned, asked about the prospects of contracting with a retail dealer for assuring sales. Maybe the dealer could sell quicker and more readily than the builder, but he would want his "pound of flesh," which is usually 33 1/3 per cent. of the proceeds; so down goes our builder's "wages" by one-third, right away.

"Private Middlemen"

There is another person out to make profit at the expense of anybody who can build a good locomotive, and that is what I call the "private middleman." He finds somebody who wants to buy a locomotive, and says he can supply it, at a price. He then searches around for some

poor kite who will build the engine at about half the price he is asking for it, gets delivery, passes on the job, and pockets the proceeds. Somebody tried a similar wheeze on your humble servant; the person bought a commercial engine that was useless, and brought it to me for examination. I told him it was no good, but as he seemed disappointed, I offered to sell him a re-built oil-fired engine which I had no use for, at a silly price, which offer was promptly accepted. Soon after, he asked if I could find him a used coal-fired engine of my own make; and as a friend was disposing of one, due to removal and ill-health, I passed on that engine at about half its value. Soon after, I discovered that the first engine had been re-sold with my name as guarantee, for £10 profit, and negotiations were under way for selling the second at £20 profit! Needless to say, I promptly "severed diplomatic relations" with the person in question, and although he sent several apologetic letters, saying that he meant no harm and did not realise what he was doing, I couldn't bring myself to be on friendly terms with one who had exploited my endeavours to help him, as a means of lining his pockets.

Mass Production

Three or four of the queries were of a different kind, and proposed to do the job on a larger scale. One querist proposed to set up a proper machine-shop, and turn out finished parts to aero limits. Another wanted to know what were the prospects of carrying on where Carson's left off, and putting some really good lines of finished locomotives on the market, at a price equivalent to Carson's, taking into account the general rise in the cost of raw materials, labour, and overheads. In cases like this, it is difficult to offer advice. In my notes, I give instructions for building locomotives from A to Z, as far as I am able, and am practically out of touch with the commercial side of the business; the only connection is when somebody writes and asks if a locomotive built or sold by Messrs. So-and-so, or Who-is-it, is efficient and satisfactory, and worth the price charged. I just give my own honest opinion, without prejudice. In my instructions, I never advocate buying finished parts and incorporating them into locomotives of my own design, unless exceptional circumstances warrant it; and from my correspondence, it is pretty clear that the followers of these notes prefer building a locomotive themselves to buying one ready-made. In view of the prices previously mentioned, one of the reasons is obvious! However, among those whose time is limited, and those who have neither mechanical skill, nor equipment, to build a locomotive, yet have an intense longing to possess one, there should be a market for finished engines at a moderate price; but I doubt if there would be a sufficiently large one to justify the outlay on a special plant to build locomotives alone. It would make an excellent side-line that would pay its way all right, for a small plant engaged in other mechanical work, such as sewing machine and refrigerator components, or the higher class of mechanical toys like those which emanated from Jerryland.

The connecting-rod and crankshaft in the head of mother's sewing-machine would have been just right for a 3½-in. gauge locomotive; the crank was 1½-in. stroke, and the circular-section rod with its marine big-end was Stroudley to the very life. The same machinery that stamped out the parts of the shuttle mechanism, could have knocked out expansion-links, combination-levers, and other valve-gears parts till the cows came home, with suitable dies; and press tools have vastly improved since those days. The modern type of automatic turret lathe used on small gas and water fittings, would have no difficulty in making safety-valves, clack-boxes, water-gauge mountings, angle and globe valves, injector-cones and so forth, by the bushel; and they could be sold at the same price as the gas and water fittings previously mentioned, though that would certainly *not* please the "model" shops!

A Suggestion for Home Workshops

More than once I have been offered unlimited financial backing, from both sides of the big pond, to start up a works and do the job thoroughly, not only supplying everything for all sizes of locomotives from 15-in. gauge down to "O," but complete locomotives and rolling stock, finished components to guaranteed limits, and toy engines for the kiddies, aiming to knock out both profiteers and Jerry at one fell swoop; but in the twilight of life I have neither incentive nor physical energy. Reference to the kiddies, however, reminds me that there is a good demand for a fairly low-priced steam locomotive that is a cut above the usual externally-fired job with the Jerry type of piston-valve cylinders. If any home worker started to build a dozen or more simple engines like "Mollyette" or the "Chingford Express," or even the six-year-old's "4F," he would find that making up the parts in quantity, wouldn't take very much longer than making them singly, once the machine is set up. The ordinary pedal-driven lathe would be perfectly suitable, plus a hand-operated drilling-machine, and the usual hand tools; and no elaborate outfit would be necessary for brazing up the insides of the boilers. Very little practice would make the assembly and erection a mere matter of routine, and the builder would get a little amusement and pleasure from testing the finished locomotives on the track before painting them. Judging from the time it took me to knock up the original "Mollyette" from scrap and oddments, it should be a paying proposition to sell such engines at a price favourably competing with the Jerry type of toy, and they would still be running long after the Jerry type had found its way to the domestic ash-bin. Whereas one might not find a customer for a 2½-in. or 3½-in. gauge "Live Steamer" at the prices previously mentioned, there would be dozens of clients for the toy engines; I've had plenty of requests to build "4F's" and not from six-year-old folk, either! One displayed in the shop window of a friendly tradesman in any busy shopping centre, with a descriptive price ticket on it, would be all the advertisement needed; and a demonstra-

(*Continued on page* 322)

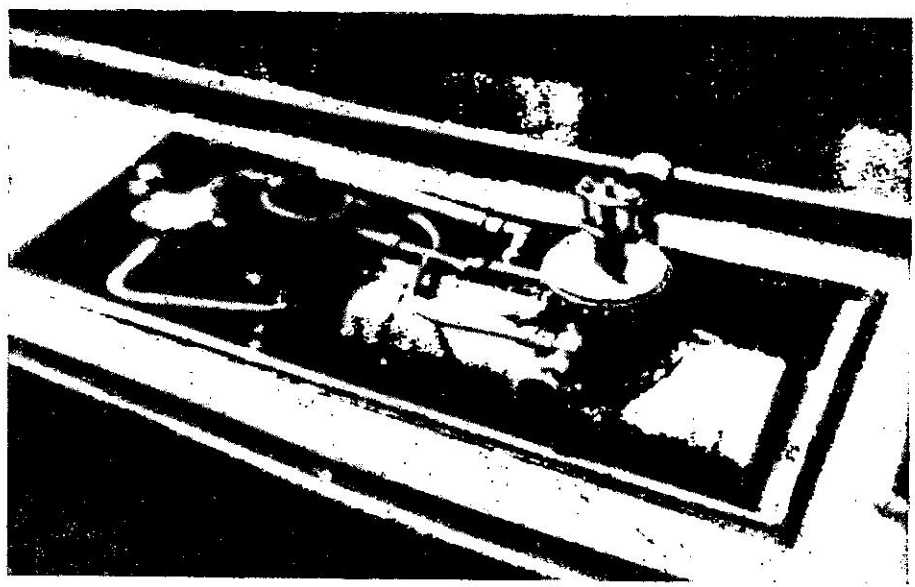
A 4-ft. Tug, "Peggy," By W. J. STEVENS

THE chief object in making my tug "Peggy" was to make it a no-trouble boat. Nothing is more annoying than, after the trouble of getting it to the pond, one has to be continually fiddling with it in the course of a morning's run. I have achieved that end, to my mind, by over-boilering the engine, making an efficient slow-speed boiler feed-pump and installing a good bilge-pump.

The boiler is the usual centre-flue with a large dome, to ensure getting reasonably dry steam, and firing is by a paraffin blow-lamp. I have tried superheat, but find it a bit too harsh, and lubrication troubles begin to arise; so she uses steam and several times I have forgotten to take my oil-can to the pond and have run the engine dry, but nothing serious seems to have happened.

This boat is now about eight years old and has done a lot of trouble-free running and has given pleasure to a lot of spectators. I put in an automatic device which blows the deep-note whistle about every three minutes whilst

(*Continued on page* 325)



Looking into "Peggy's" engine room

Ship Modellers' Corner

By EDWARD BOWNESS

THE anchor crane consists of a stout pillar, a strut which is forked to rest on the base of the pillar, and a tie to support the strut at its outer end. The lengths and relative diameters should be taken from Fig. 13. The crane should be made in wire of the appropriate thicknesses, soldered at the joints, and with the pillar left long enough to fit into a hole in the fo'c'sle head. The lower block of the tackle, which had triple sheaved blocks, is lashed to the strut when not in use.

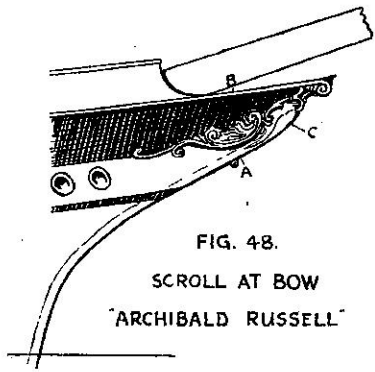


FIG. 48.
SCROLL AT BOW
"ARCHIBALD RUSSELL"

Exterior Details of Hull

Before the hull may be considered complete, there are a few exterior details to be attended to, and one of the most important of these is the scroll, which, in this vessel, replaces the more usual figure-head. This is shown in some detail in Fig. 48 herewith. It will be seen that the decoration blends with the line of the plating, and when the ship had painted ports the dark band above emphasised the effect. Later, as was the case with most ships of the period, the decoration was removed, leaving merely the termination of the scroll. Unfortunately, whoever removed the decoration paid no attention to the form, cutting it off opposite the point marked A in the drawing, and thus leaving the crude effect shown in the accompanying photograph. This was very kindly sent me by Mr. Donald Middleton, of Northampton, who visited the ship at Goole recently. However, as we are showing the ship with painted ports, we should show the decoration in its original form. To do this, the strip which forms the top-gallant rail—see Fig. 20, in the issue for June 28th, 1945—should terminate at about the point marked B, in Fig. 48, and be continued by a more or less triangular sheet of brass of the same thickness pinned or screwed to the wood below. The tip should be turned down to form the scroll and a blob of solder sweated on the bend and filed to a point as shown. The fullness below, marked C in the drawing, could be built up with Durofix. The scroll on each side may be formed from a wisp of silk or cotton thread fixed in place with adhesive. With a little careful manipulation with a pointed tool, this can be persuaded to lie correctly before the adhesive sets. After painting the hull the

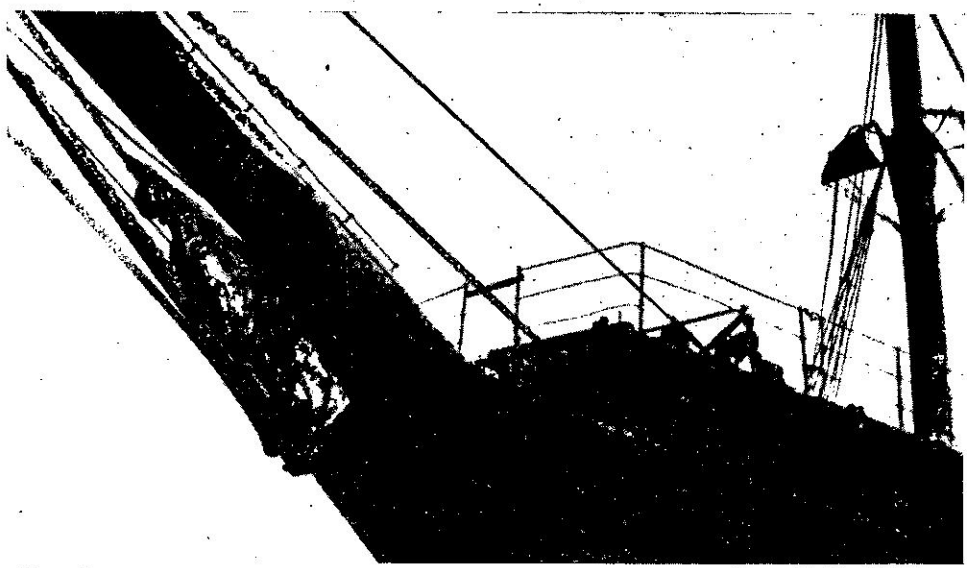


Photo by] [*Donald H. Middleton*

Scroll at bow of 4-mast barque, "Archibald Russell," 1905

decoration should be gilded, when it will look quite effective.

Rudder

Fig. 49 shows the rudder in full detail as actually fitted to the ship. How much of this detail is shown must be left to the discretion and to the ability of the modeller. The important point to remember, whether much or little detail is shown, is that the centre-line of the rudder stock must be in line with the centre-line of the hinge pins.

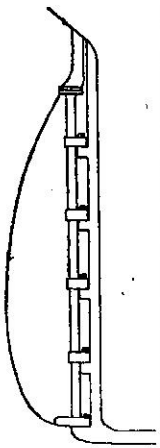


FIG. 49

Freeing Ports

There are five freeing ports on each side of the main deck bulwarks. They are hinged horizontally at the centre and again at the upper edge, so as to allow the doors to swing outwards, and so free the deck of water when any comes aboard. Their position is indicated in Figs. 10, 11, 12, on pages 542, 543, 544, of the issue for June 7th, and their appearance may be seen in the photograph on page 379 of the issue for October 18th. The mooring ports—three on each side—are also shown in the same drawings and photograph. These should be drilled and then elongated with a small round file. The freeing ports, however, could be shown by merely cutting the outline with a small chisel, making the cut sufficiently deep to show through the painting.

Portholes

The portholes should be shown by drilling $\frac{1}{16}$ in. holes in the appropriate positions and putting a spot of Durofix in each to represent the glazing. Alternatively, they could be painted, using black or dark green, and if a suitable punch is available they could be marked in before painting as with the freeing ports. I have seen portholes shown very effectively by inserting a tiny brass ring in each hole, but this would not be appropriate here as the frames do not show on the outside. This will be seen in the photograph already referred to.

Painting

The hull above the row of ports and up to the top-gallant rail is painted black, as is also the narrow strip below the ports. The ports themselves are black on a white ground. The upper edge of the port band follows the lower edge of the upper strake of plating, which is shown clearly in the photograph of the hull on page 379 of the issue for October 18th, 1945. The lower edge of the narrow black band below the ports follows the lower edge of the second strake of plating, which is shown also in the same photograph. The black band should be 1/32 in. wide in the model, becoming slightly wider towards the stem. Under the counter the line of the plating rises somewhat, and the black band follows it until it meets the upper strake, as shown in Fig. 50. Above the top-gallant rail the hull is painted white. At the stern, from the point where the top-gallant rail ends—see Fig. 10 in the issue for June 7th, 1945—the white terminates in an upward curve as shown in Fig. 50.

Below the narrow black band the hull is painted light grey with perhaps a slight tendency to purple—but much more grey than purple. From the water-line downwards the hull is coated with anti-fouling paint, which is approximately Indian red in colour. Note that the painted water-line is slightly above the actual L.W.L., rising somewhat towards each end of the vessel. The name on the bows and stern should be in yellow letters, and the Port of Registry on the stern should be Glasgow, to agree with the period represented in our model. I find that none of the drawings given so far indicate the position of the name at the bows. It is painted just below the top-gallant rail and extends from just below the lighthouses to half-way along the topgallant fo'c'sle. With regard to the kind of paint to use, my experience favours ordinary oil colours, artist's quality. If the finishing coat is used with a little Megilp it will be found that varnish is unnecessary. Varnish should be avoided if possible, as it tends to clog fine detail, besides which it gives an unnatural glossiness to the work.

Figureheads

This seems to be an appropriate time for the promised discussion on figureheads. Many otherwise fine models are spoilt by an awkward figurehead. Perhaps the fact that so few of us have had the opportunity or privilege of seeing a really fine figurehead has something to do with it. At its best the figurehead was a dream of beauty in the way it blended with, and finalised, the lines of the bows and stem. Some of the small sailing coasters had rather quaint figureheads, but these had been carved by such craftsmen as were available at the small ship-

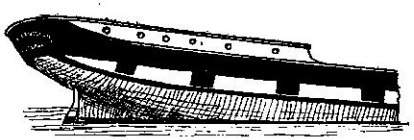


FIG. 50. PAINTING AT STERN

yards. Those who carved the figureheads of the clippers and the larger ships and barques, were usually famous artists at their craft, and took their work very seriously.

Apart from the difficulty most amateurs find in drawing or carving—especially in carving—the human figure, the principal fault in most of the figureheads one sees on ship models is that they are too stiff and straight. The figure seems to have been carved for the normal upright pose and then fixed in position in line with the stem of the model. The result is that the figure is in a rather awkward and uncomfortable position with its eyes staring into the sea. The figurehead should be shown looking

forward in the direction in which the vessel is sailing. Whilst the lower portion of the figure slopes in line with the stem, the chest and shoulders are arched back to carry the head in an upright position.

Typical Examples

The three photographs here reproduced are given as typical examples. The earliest is the figurehead of H.M.S. *Topaze*, of 1858. In these early ships the stem was more upright than it later became, consequently the general line of the figure is more upright. This is a very good example of the way the scroll in the sheer line of the ship is blended with the draperies of the figurehead. This feature was discussed in the "Ship Modellers' Corner," in the issue for August 31st, 1944.

The next example is from the ship *Mount Stewart*, built in Aberdeen, in 1891, and shows the use of a male figure as a figurehead. At this time it was the custom for the figure to have one arm extended backward and the other flexed across the chest. The draperies are still blended with the scroll of the sheer line. The panel above the sheer line tapering down from the draperies, is very characteristic of this period. When painted ports were abandoned this panel often disappeared. Something of the kind happened with the *Archibald Russell*. This photograph of the *Mount Stewart* illustrates also what we have been saying about the painting of the *Archibald Russell*, the only difference being that the *Mount Stewart* had a beading along the sheer line above the ports, whereas the *Archibald Russell* had none.

Photo by] [*Nautical Photo Agency*

Figurehead of H.M.S. "Topaze," 1858

Straining Forward

The third photograph shows the figurehead of the *Killoran*, a big 3-mast barque, built at Troon, in 1900. Originally she had painted ports and most probably the draperies of the figurehead were continued in a scroll. At the time the photograph was taken this had disappeared, but still the figurehead fits the stem and the head is thrown back so that the eyes—in fact the whole figure—is straining forward with the ship.

As a final comment on this point, we add an outline drawing, Fig. 51, traced from the builder's plans of the *Archibald Russell*, showing the

Photo by] [*Nautical Photo Agency*

Figurehead of ship "Mount Stewart," 1891

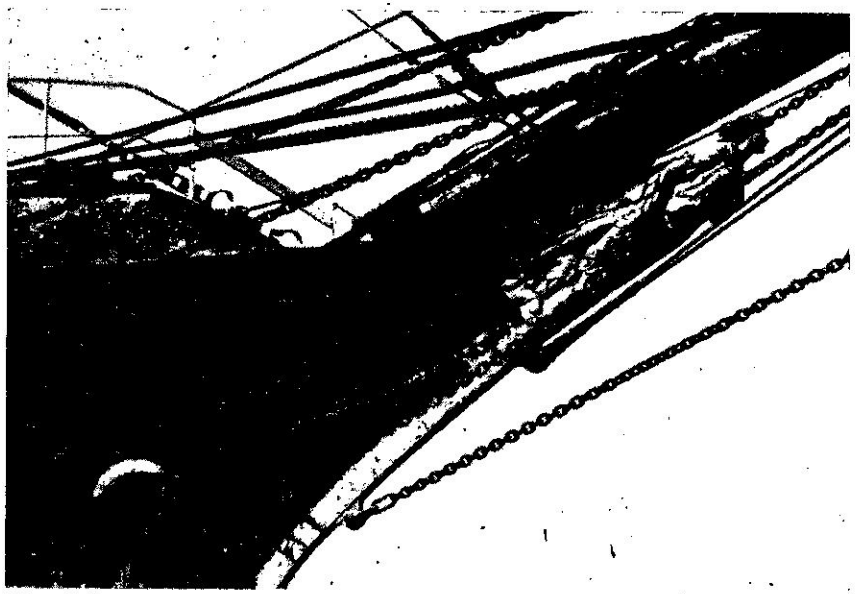


Photo by] [*Nautical Photo Agency*

Figurehead of the barque "Killoran," 1900

figurehead fitted to her sister ship *Hougomont*. The draperies are blended very artistically with the sheer line and the scroll which is formed above it.

In conclusion, the point to bear in mind when fitting a figurehead to a ship model, is that, whatever the angle of the stem, the figure should be fitted gracefully to it, and that the head and shoulders are always arranged so that the eyes are looking forward. In some cases the figure was shown with an outstretched arm, sometimes holding a trumpet, and in the well-known case of the *Cutty Sark*, whose figurehead represented the witch Nannie, the left arm reached out to grasp the tail of Tam o' Shanter's grey mare Meg.

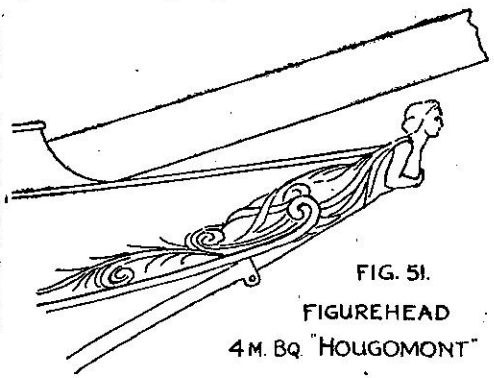


FIG. 51.
FIGUREHEAD
4 M. BQ. "HOUGOMONT"

"L.B.S.C." (*Continued from page* 317)

tion at any suitable gathering would bring the demand all right; just try it and see! Stationary engines, cranes, and suchlike, could also be made and sold in a similar manner, and overhauls and repairs to existing engines of all kinds undertaken. I honestly think that this would be a far better proposition for anyone who wants to make a home workshop provide a living, than building "live steamers."

There are, of course, exceptional cases where a skilled home worker might earn a very good living by specialising; for example, a twin brother of Inspector Meticulous, with a five-figure bank account and a passion for locomotives, wouldn't care a bean what he paid for a job, so long as it satisfied his fastidiousness. Any builder who could satisfy his requirements, would not have to worry about his earnings for the rest of his life; for the Inspector's brother, having got something that really was the "cat's whiskers," would promptly emulate Oliver Twist.

But don't forget a satisfied customer not only comes back, but is a perpetual advertisement!

Postscript *re* "Hielan' Lassie"

I forgot to mention, when describing the "fabricated" cradle, that the position of the drag-beam is $\frac{5}{8}$ in. from the top, so that it is at approximately the same height from rail level as the front buffer beam. Castings will have lugs on them, in the correct position for attaching the beam, Several builders were apparently puzzled by the projection at the front of the cradle, below the main frames. This is merely the end of the fixing angle, which is made full depth of the front of the cradle and rounded-off where it projects below the main frame.

*IGNITION EQUIPMENT

By EDGAR T. WESTBURY

A comprehensive review of the working principles, design and construction of electrical ignition apparatus employed on all types of internal combustion engines

Part II—Design and Construction (*Continued*)

THE question of possible alternatives to the orthodox forms of ignition apparatus is one which has been briefly touched upon several times in the course of these articles, but as it has again been raised by a number of querists, it may be in order to make some further comments on this subject. In most cases, it would appear that these querists are not confident of their ability to construct ignition coils or magnetos, the winding operations on which seem particularly formidable to them, and are looking for something simpler or less delicate in construction. Suggestions have been made, or questions asked, regarding the possibilities of such things as static electrical machines, and also several non-electric ignition devices, including catalytic igniters, heated tubes or bulbs, and even that hardy survival, the flint lighter.

I do not rule out any of these devices as totally impracticable, but I think that those who advocate them would find their apparent simplicity rather deceptive. Static electrical machines, mostly of the "influence" type, as distinct from "frictional" machines, were tried out fairly extensively in the early days of I.C. engines, but so far as can be gathered, were found to be unreliable. Any readers who have had experience with these machines, including that spectacular favourite of the old school science laboratory the Wimshurst, will agree that they could be extremely sulky at times, especially in damp weather, and I have known occasions when no amount of coaxing would succeed in producing the faintest ghost of a spark from the terminals. Many years ago, a form of influence machine of the cylindrical type, and quite compact in size, was produced for use as a gas lighter. I have been informed that this was very reliable in action, but all my efforts to obtain more fully detailed information about it have been unavailing. Can some reader help?

Another difficulty in the use of static electricity for ignition is in the accurate timing of the discharge, but it is possible that a practical solution to this might be found in the light of modern knowledge, also that some totally new form of static generator might be evolved. I admit that I have not made any serious investigation on these lines, so my advice to querists who want to play around with static is that they will undoubtedly have lots of fun, if nothing else; but like all forms of experimental work, it will not be a walk-over.

Non-electric ignition devices, which, for a time at least, were a serious rival to electric ignition, are hardly likely to be very well suited to modern requirements, as their inherent disadvantage is sluggishness, which makes them unsuitable for high-speed engines. Stationary engines, the speed of which does not exceed a few hundred r.p.m., run well enough on hot tube ignition, and small engines down to about 1-in. bore, running on coal gas, were at one time fairly popular in the model trade. (The flame ignition engines, mostly of Continental manufacture, which enjoyed a brief heyday about the beginning of this century, were of a type now definitely extinct, being low-efficiency non-compression two-strokes more closely allied to hot-air engines than modern I.C. engines.) Such engines usually consumed far more gas to heat the tube than was used in the production of useful work.

Somewhat similar limitations apply to any form of ignition device which needs either the temporary or continuous application of extraneous heat, including the electric glow (resistance) heater, which has been suggested by some correspondents as a very simple substitute for the sparking plug and ignition coil. One point about the use of electricity in this way is that the current required to operate a glow heater is usually much greater than that consumed by a small ignition coil.

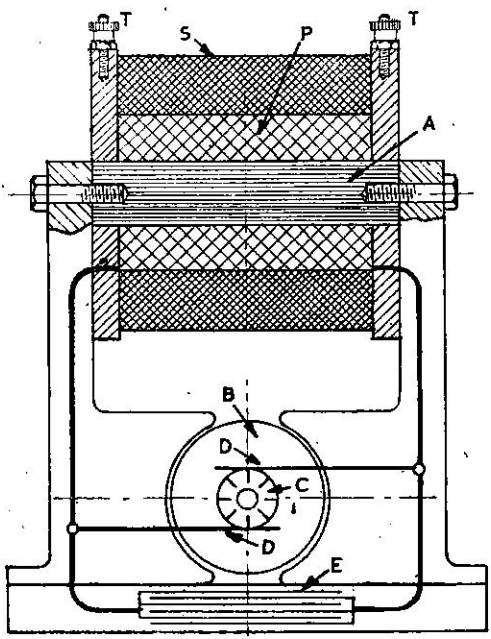


Fig. 75. The Bottone "Dynamo Coil" (circa 1902)

*Continued from page 264, "M.E.," March 14, 1946.

The use of a catalyst, such as a platinum filament or a pellet of "platinum black," is liable to be still more difficult to apply in practice; it was by no means neglected by the early experimenters, but so far as can be ascertained, little or no success attended their efforts. Other ideas which appear to have ended in blind alleys were the use of a self-igniting chemical or gas (such as phosphoretted hydrogen) introduced into the cylinder at the end of the compression stroke, or a minute quantity of a fulminating explosive introduced on a feed band into the cylinder and struck with a hammer—like the toy pistol "caps" of our juvenile days.

It may interest readers who have put forward the idea of adapting the flint lighter to I.C. ignition, under the impression that it was a brilliant new idea, to learn that, according to information received from one of my friends, a patent was taken out for an ignition device on this principle, prior to 1900! I can foresee that several difficulties might arise in carrying such an idea into practice, and once again, I express the opinion that patient experiment, with, perhaps, a 50-50 chance of ultimate success, is the only way to achieve success with devices of this nature. There are no short cuts in research work!

Dynamo Ignition

Other querists have asked me whether it is possible to use an ordinary current generator, or dynamo, as a direct source of supply to an ignition coil. I assume that this question arises principally in cases where the engine is used to drive a dynamo, as in a miniature charging set. In such cases, the dynamo would normally have quite an ample margin of current output, and should be capable of energising the normal type of ignition coil used on small engines.

There is, however a possible difficulty which may arise when using a wound-field generator for direct ignition supply, and which is particularly liable to affect starting efficiency. Such machines often take a few seconds to "build up" to their normal working voltage from the small amount of residual magnetism in the field-magnet; during this time, the entire current generated in the armature is required to energise the field windings, and it may thus be necessary to spin the engine at high speed for some time, before sufficient current is available to produce a spark. Of course, if the dynamo is used for charging, the accumulator—provided it has not been discharged "flat"—can be used for ignition; but in that case it is no different, essentially, from the ordinary coil and battery system.

I have used the dynamo for direct ignition supply with complete success in one of my miniature generating sets, but in this case, a permanent-magnet field was used in the generator, which produced alternating current, and in this respect the system resembled that of the early Model T Ford car, except that a non-trembler coil was used, instead of the trembler coils employed in the latter.

Any form of current generator, however, is found to be less efficient, relatively, at low armature speed, than a high-tension magneto, because the e.m.f. generated depends purely and simply on the number of lines of force cut in unit time by the armature, and is not augmented by such devices as sudden collapse of field, as in the magneto. Some forms of generators are practically non-effective until they are run at something approaching their normal working speed, but this is a matter of design, which can be varied to suit their specific purpose.

I understand that dynamos are now used for direct ignition supply on certain specialised forms of modern engines, about which no detailed information is so far available, but it appears that they have a very large margin of output, on the fairly common principle that a steam hammer can be fully relied upon to crack an egg!

A suggestion was recently made that, as even the best modern magnet steels rarely approach the efficiency of a good electro-magnet, it would be worth while to use wound field-magnets in an ignition magneto. Theoretically, there is something to be said in favour of this idea, but in practice it is very cumbersome, and introduces all the disadvantages of the wound-field machine, in return for only a problematical increase in electrical efficiency.

In my experiments with rotary-magnet magnetos, I have made tests on the effect of varying the efficiency of the magnet, by using a wound rotor, fitted with slip rings and supplied from a battery through a control rheostat. This measure was adopted purely for the purpose of acquiring data, and served this purpose very effectively; but there was never any intention of making it a permanent feature of design. Obviously, the necessity for using a battery to energise the magnet would be a great disadvantage, and one might as well revert to an ordinary coil and battery system.

A compact and efficient self-exciting magneto on these lines might be a difficult proposition, but not necessarily impracticable. It would probably be found desirable to incorporate a separate winding, not connected in series with the contact-breaker, to maintain constant excitation of the field, as it would be undesirable for this to be interrupted. The problem, again, is a very intriguing one—but is it necessary, or worth while?

An Early Dynamo Coil

Spark generators working on the principles discussed above were produced in the pioneer days of I.C. engines. One such device, produced in 1899, by the Elbridge Manufacturing Co., of America, was made in two sizes, the larger of which weighed 47 lb., and the smaller, 14 lb.—hardly the sort of machine that model petrol engine constructors are looking for! The available details of these machines are somewhat vague, and although described as ignition spark generators, they may not have been high-tension machines; possibly they were used for supplying current to low-tension igniter plugs, such as still used on some low-speed engines at the present day, and which have been described in these articles.

A true high-tension generator, described as a "Dynamo Coil," was, however, produced shortly afterwards in this country by that versatile electrical genius, Mr. S. Bottone,

whose name may be familiar to some of the older readers of THE MODEL ENGINEER, as he was a fairly regular contributor in the good old days. This device is illustrated in Fig. 75, which is reconstructed from the somewhat vague sketch accompanying its description in an ancient journal, from which the following is quoted verbatim :

"This machine is described as a hybrid between a dynamo and an ignition coil . . . . The field-magnet core A is built of the softest iron wire obtainable. Over this is wound the series coil P of the dynamo, which may be regarded as the primary of the induction coil. Over this primary coil is wound several thousand turns of fine insulated copper wire S, as for the secondary of an induction coil, the ends being brought out to the terminals T, from which the current is carried by suitable conducting wires to the sparking plug of the engine, or to any required electrodes.

"The primary winding is connected in series with the brushes, resting on the commutator C, attached to the armature B, and imparts magnetism to the core ; a shunt branch of this wire is connected to a condenser E built in a suitable recess made of aluminium below the base of the machine. This base forms a solid iron casting [*sic*], combining pole-pieces for the dynamo proper, and two standards, in connection by means of bolts with the soft iron core of the coil held between the standards. The commutator is constructed specially to interrupt the current sharply, no other contact-breaker being required.

"These dynamo coils can be made to give sparks of any desired length, from ¼ in. to 1 in. or more in air. They are compact, since the overall dimensions of the usual size are only 8 in. by 8 in. by 7 in. They are also very light, this size weighing only 12 lb. The smaller size, giving a ¼ in. to ½ in. spark, costs £5, and the larger, used for Röntgen ray, wireless telephone [*sic*] and other work requiring long sparks, £15.

"A serious objection to the use of dynamos for generating the sparks required for ignition devices has been met by the same inventors in a specially devised gear for driving the machines at any speed desired by the driver of the motor, and to work the machine by hand to start the motor. The flywheel of the engine is faced with a light smooth disc. Across this disc runs a light shaft, fitted with a friction pulley running on a feather. One end of this shaft is connected with the shaft of the dynamo armature, the other being held in a journal outside the periphery of the flywheel. A guide-bar, with fork and handle, is so fixed as easily to slide the friction pulley to any part of the disc, from its centre to the outside rim. If the flywheel is revolving slowly (as when starting the engine) the driver draws the friction pulley out near the rim of the disc, where it drives the dynamo at a fast speed, and thus furnishes sparks to fire the charge. As the speed of the motor increases, the friction pulley is slid near to the centre of the disc, to reduce the speed of the dynamo."

I have considered it worth while to include the description of the friction driving gear, though such a device is neither applicable nor necessary for a modern high tension magneto ; but it is interesting as an early adaptation of the variable-speed friction transmission gear which has since figured largely in many diverse forms of mechanism, including motor cars, machine tools, coil winding machines, and in miniature form, has proved highly successful in THE MODEL ENGINEER Road Roller, and the "1831" petrol driven locomotive.

For the rest, I think most readers will find the description of this machine interesting as another example of the ingenuity of the early pioneers in this department of engineering. Many of the half-forgotten devices of an earlier decade may yet be revived to form an important contribution to modern progress ; and when one is looking for brilliant, novel, or ingenious ideas, there are many far less likely places to look for it than in the pages of an ancient and musty technical journal.

(*To be continued*)

A Model Tug "Peggy" (*Continued from page* 318)

the tug is steaming about, which is very effective and causes a lot of amusement.

At the low pressure of 40 lb. in the boiler, it steams at a right speed of about four miles per hour for about two hours, or as long as the blow-lamp lasts, with only about five quarter-minute stops to fill the water feed-tank. I do not pump the water from the pond, as grit, etc., is bound to get through in the course of time ; further, I know the boiler is being fed when I see the water level has dropped in the tank. No water-gauge is fitted.

The boat is of pine, with copper bulwarks, oak deck, and stainless-steel rubbing-band. The metal top which fits into the deck has pilot-box, funnel and engine-hatch, and ventilators, etc., fitted on it ; the whole lot comes off in one piece and one can readily get at the inside.

I bought the engine in machined parts, as it was so reasonable in price that it was not worth while making one. The only alteration I made was to re-bore the bearings and main parts and re-bush with hard phosphor-bronze. It is a Stuart ¾ in. × ¾ in. No. 10, which has given every satisfaction.

The deck fittings are : hand anchor-winder, dummy steam windlass engine, recoil gun, knurled screw adjustment for rudder, and the usual rope fittings. I made a lot of fittings but took them off, as I do not like too many for this class of boat ; it looks too untidy on the decks. The boat is 4 ft. long by 10½ in. beam, and weighs about ½ cwt. when ready for running. The boiler is 9 in. long, 4½ in. diameter, 2½ in. flue with eight cross-tubes, ⅜ in. diameter, silver-soldered throughout. The feed-pump is geared 25-to-1, with ½-in. diameter ram and ½-in. stroke.

There is only one fault, the boat is rather heavy and it could have been made a little lighter by making some of the fittings of aluminium instead of brass and copper ; so intending builders please note. Weight is necessary for locomotives but not for boats, especially when one has to get it about to different waters!

Letters

Workshop Ideas

DEAR SIR,—May I be allowed to draw your attention to a slight but important error in Mr. Parsons's statement regarding reversing what he calls a Repulsion-Start motor. A repulsion-start motor is not reversed by altering any of the leads coming out of it, but only by altering the position of the brushes. What your correspodent evidently has is just the simple induction motor with either three or four wires at the terminal block ; reversal may be attained by changing any of the two respective winding wires, that is, the start or run winding, but not both.

A repulsion-induction is a combination of the repulsion motor and the induction motor. The reason for this combination is that a repulsion motor will give a greater starting effort than the plain induction motor for a given current input, and to incorporate this feature in the simple induction motor we do not fit it with a squirrel-cage rotor. A wound armature is fitted to the R.I. motor having a commutator and brushes ; during starting, the brushes (which are short-circuited) rest on the commutator and the winding is in circuit with the brushes joined together. The effect of using the winding in this manner enables a good torque to be obtained with a reasonable expenditure of input current ; as the motor reaches speed, these brushes are lifted from the commutator and, at the same time, all the commutator segments are short-circuited. You now have a motor running as an induction motor, the shorted comm. being equivalent to the short-circuited rotor.

The importance of the error is this : with some R.I. motors, only two wires are brought out ; with others, there are four ends and any attempt to alter these ends could lead to serious trouble. The motor could be burnt out by having the coil sets connected in opposition. The provision of four wires in some makes of this style of motor is for the purpose of providing a two-voltage motor in one frame size, and, in this case, the winding is connected in series for the higher voltage and in parallel for the lower.

Yours faithfully,

Enfield. G. W. COOPER.

Small Turbines

DEAR SIR,—I was interested in Mr. Johnson's letter in your issue dated February 14th, 1946, and the matter contained therein. Much as I appreciate his work, I am afraid, I am still unconvinced about the possibility of the small turbine matching the small reciprocator on a thermal efficiency basis. I admit, of course, that steam consumption alone cannot be taken as the final measure of thermal efficiency, but heat rate or fuel consumption certainly can.

Doble gives the following heat rates for various types of engine under varying conditions. I give them all for a piston speed of 800 ft. per min. :—Simple twin-cylinder, 4-in. × 5-in. stroke ; compound, 3-in. and 5¼-in. × 5-in. stroke ; triple, 2⅛-in., 4-in. and 6½-in. × 4-in. stroke.

The triple *only* has a re-heater, which imparts 120 B.T.U. to the L.P. steam.

	Heat Rate	*Water Rate*	
Simple ..	18,000 B.T.U.	14 lb.	*Per*
Compound	12,500 „	10 lb.	*B.H.P.*
Triple ..	10,000 „	7 lb.	*hour.*

These are figures from an actual series of tests, and there you have the necessary data for straight comparison with the turbine. I am very strongly of the opinion that no small turbine will be able to approach even the figures for the " simple," let alone the " triple."

Let me set out in Doble's own words some of the principal difficulties facing the designer of small-power turbines :

" In small-power plants with high steam pressures, the turbine suffers from many disabilities. The great density and consequent small volume of steam at high pressures requires very small passages. The blades would, therefore, have to be very short, and as the running clearances between the rotating blade and the stationary blades cannot be reduced safely below that now used in normal pressure turbines, the amount of steam which would leak from stage to stage in the higher pressure zone of the turbine through the clearances would be a large percentage of the total steam flow."

Doble carries the detailed argument much further, perhaps the most important point being the unquestionable need for high vacua to obtain real efficiency with turbines. He summarises by saying that probably the ideal arrangement would be to use high-pressure, high-temperature steam in a multi-stage reciprocating engine and exhaust at 40 lb.-50 lb. sq. in. absolute to a reaction-type turbine, which, in turn, would exhaust to a high vacuum.

As the reciprocator direct, even in quite simple form, will give a heat rate of 12,000-14,000 B.T.U. per H.P. hr., the possible extra gain of the above-mentioned scheme would appear to be dearly bought at the very considerably increased cost and complication involved. Once more let me emphasise that I am entirely at one with Mr. Johnson in desiring to see the small turbine improved, and his method of approach appeals to me as being the only basically sound one, but I am still very doubtful, indeed, if small turbines, as at present known, will ever be able to approach small reciprocators on a thermal efficiency basis. I will make Mr. Johnson a sporting offer ; I have on the board at the moment a small two-cylinder diagonal single-crank compound, designed to work at about 125 lb./per sq. in., and a fairly high (for a model) superheat. It is combined with a fairly normal type of boiler and embodies a re-heated receiver and a feedwater heater. The cylinders are ¾ in. and 1¼-in. × ¾-in. stroke, using flat valves and a fixed cut-off valve-gear. The engine is non-condensing.

At 2,000 r.p.m. it should develop close on one-tenth B.H.P. I should be very glad to test out this plant against a turbine plant of approximately similar output, and I believe the reciprocating plant would show up the better.

Yours faithfully,

Harrow. K. N. HARRIS.

Small Cine Projector Design

DEAR SIR,—I was very interested to read the article by "H.J.H." in your issue of February 21st, 1946.

There is, however, one point which I should like to take up regarding the intermittent motion. Your contributor comments on the preference given to the use of the claw mechanism rather than the intermittent sprocket, and then makes the statement that "it is not known why an intermittently operated sprocket is not used to any extent with sub-standard projectors." As a matter of fact, the reasons for the preference are not far to seek.

For purposes of comparison we will assume that we have before us a 35 mm. and a 16 mm. sound projector, each with the usual four picture intermittent sprocket. We will also be generous and assume that each machine is so designed that the film is in contact with the intermittent sprocket for 180 degrees. (It is usually considerably less than this.) In the case of the 35 mm. machine there will always be sixteen perforations engaged with the teeth of the sprocket, so distributing the pull on the film over a very wide area. The 16 mm. machine will never have more than three perforations engaged under any circumstances. For all practical purposes the number will be two. Moreover, the 16 mm. sprocket will only be about $\frac{3}{8}$ in. in diameter compared with slightly under 1 in. for the 35 mm. machine, and a radius of $\frac{3}{16}$ in. is somewhat small to be traversed by 16 mm. film, the film tending to spring from the sprocket teeth amongst other things.

An attempt has been made to overcome the trouble by using an eight-picture sprocket with an eight-slot "Maltese cross," but if this arrangement is sketched out on paper and compared with the four-slot cross it will be seen that the ratio of picture shift to light is cut down very considerably if the striker pin is still to enter the slots tangentially. Unless this condition is reasonably fulfilled the film will be subjected to considerable strain when starting and stopping its movement in the gate.

There is also the point that unless it is very well designed and manufactured a Maltese cross movement is far noisier in operation than a claw movement, a point of extreme importance in the case of sub-standard machines designed for home use.

Moreover, it is possible to design a successful claw movement with a higher ratio of picture shift to light than is possible with a Maltese cross and intermittent sprocket.

It is hoped that these few remarks will be of interest to readers and that they may serve to throw a glimmer of light on an interesting but somewhat complex problem.

Yours faithfully,

Sheffield. H. GERALD TOOTHILL.

Clubs

Lincoln Model Engineering Club

The above club will pay a visit to Messrs. Myford's works, at Beeston, Notts., on Saturday, March 30th. Those intending to travel should send in their names to the secretary at once. Bus will leave Technical College about 1.15 p.m.

A visit to the Lincoln Corporation Pumping Station at Elkesley has also been arranged for Saturday, April 27th. It is also hoped to pay a visit to the L.N.E.R. locomotive works at Doncaster in the summer.

Hon. Secretary: GEO. T. SINDALL, 53, Geneva Avenue, Lincoln.

Sale Model and Engineering Club

On Saturday, March 2nd, the S.M.E.C. visited the Central Control Station of the Sale Corporation Electricity Department, where members were shown all the control gear and protective devices. Mr. E. S. Pattison, the mains superintendent, showed members the interior of a control panel and explained all the interlocks which minimise risks to station personnel. The CO_2 fire protection was inspected and an explanation of its working given. The members then visited two of the outlying sub-stations, and examined old and new methods of distribution.

The visit on Saturday was followed by a lecture, on Monday, March 4th, given by Mr. J. B. Lees, M.I.E.E., borough electrical engineer, at the club. Mr. Lees showed, with the aid of numerous diagrams, the distribution from the entry into Sale with a 33,000-volt supply, through the various transformers and switchgear to the final service to the consumer. Examples of various types of cable were exhibited, together with old type and latest type fuse bridges.

Hon. Secretary: J. GRIFFITHS, 95, Northenden Road, Sale.

The North London Society of Model Engineers

On Friday, March 1st, the above society enjoyed a lantern lecture on "Gas," by Mr. Storey, who also extended an offer to the society to visit the Barnet Gas Works, an offer which was most gratefully accepted.

Work is proceeding apace on the miniature railway section's "OO" layout, whilst the boat section is busy with plans for the coming season; quite a number of new boats are almost ready for launching.

The next general meeting takes place at the offices of The Barnet and District Gas and Water Company, Station Road, New Barnet, on Friday, April 5th, at 7.30 p.m.

Hon. Secretary: E. GUTTERIDGE, "Wykehurst," Parkgate Avenue, Hadley Wood, Herts.

The York and District Society of Model and Experimental Engineers

The next meeting of the above society will be held in No. 11 room, Co-op Hall, Railway Street, York, at 7.0 p.m., on Saturday, April 6th, 1946.

Will all members please attend, as important business is to be discussed.

Hon. Secretary: WM. SHEARMAN, 28, Terry Street, York.

The Society of Model and Experimental Engineers

A Rummage Sale will be held at the Workshop on Saturday, April 6th, at 2.30 p.m. This is a private sale and only members and affiliated members may bid. May we remind members of affiliated Societies that they are welcome to attend these rummage sales as well as all other meetings.

There will be a meeting at 39, Victoria Street, Westminster, S.W.1, on Saturday, April 13th, at 2.30 p.m., when a series of lecturettes by members will be given.

Particulars of the Society may be obtained from the Secretary: J. J. PAGEY, 69, Chandos Avenue, Whetstone, N.20.

Romford Model Engineering Club

The following meetings will be held at the Masonic Hall, Western Road, near Romford Station, commencing at 8 p.m.:—Thursday, April 4th, Special Meeting, "Presidential Election"; Thursday, April 18th, by special request, "Brains Trust."

Further information can be obtained from the Hon. Secretary: FRANK E. MARKHAM, 38, Kent Drive, Hornchurch, Essex.

The Staines and District Society of Model Engineers and Craftsmen

The panel of judges for the competition at our exhibition to be held on March 30th will include Messrs J. N. Maskelyne, J. Austen-Walton (Malden Society) and, we hope, Edgar Westbury.

Mr. Bontor of the Malden Society has kindly consented to exhibit the wonderful miniature ciné theatre shown at the Malden exhibition, and entries and models on loan to date will ensure a good show, at which we hope to see members of all societies within our district.

Hon. Secretary: R. F. SLADE, 166, Kingston Road, Staines, Middx.

Mancunian Model Engineering Society

An interesting visit was had by several of our members when we visited the well-known Churchill Machine Tool Company on Saturday, February 23rd. A mock auction on Friday, March 29th, should prove a jolly evening for everybody present, including visitors. Other visits are arranged for the near future. Visitors are welcome at 8 p.m., any Friday, Girls' Institute, Ancoats.

Hon. Secretary and Treasurer: J. R. WOOD, 1, East Road, Gorton, Manchester.

Cambridge and District Model Engineering Society

Thursday, February 28th, 1946, was a red-letter day for the Cambridge and District Model Engineering Society. A very good meeting of old and, we hope, future members was held on that date at St. Andrew's Hall, Regent Street, Cambridge.

We disbanded in 1939 owing to so many of our members joining the Forces, and this meeting was a happy reunion, we trust the forerunner of many more, and was crowned by the enrolment of several new members.

Hon. Secretary: E. WRIGHT, 111, Newmarket Road, Cambridge.

Cardiff and District S.M.E.E.

At our March 6th meeting, Mr. F. W. Jones, a club member, gave a lecture on oil, etc., its production and properties in regard to lubrication in general.

Sunday, March 31st, has been fixed as the date to visit the Canton Locomotive Sheds of the G.W.R., and it is proposed to visit Messrs. John Lysaghts Iron Works at Newport on May 29th. Meetings are held on the first and third Wednesdays in the month.

Hon. Secretary: F. B. ANGWIN, 47, Rommilly Crescent, Canton, Cardiff.

Tyneside Society of Model and Experimental Engineers

An exhibition of members' models was held in the Methodist Church Hall, Ridley Place, Newcastle-on-Tyne, on March 2nd, about 80 models being on view. This was followed in the evening by a lecture given by Mr. J. N. Maskelyne, who also very kindly presented prizes as follows: "Drummond Trophy," for best coal-fired locomotive to Mr. Reavely; second prize to Mr. H. W. Evans. "Gray Cup" for best "O" gauge locomotive, to Mr. A. Standing; second prize to Mr. R. R. Gray; 3rd prize to Mr. Carverhill. 4 mm. or smaller, 1st and 2nd prizes to Mr. Charlton; 3rd to Mr. Beavis. T.S.M.E.E. prize to Mr. W. Fleming for his 1½-in. scale traction engine.

Hon. Secretary: S. G. JONES, 56, Moor Crescent, Gosforth.

The Bristol Society of Model and Experimental Engineers

Owing to circumstances not within the control of the committee, our meeting place and night have been altered for the time being.

Future meetings will be on alternate Thursdays, at St. Nicholas' Parish Hall, Trinity Place, off Trinity Street, at 7 p.m.

Hon. Secretary: C. C. LUCY, 28, Bibury Crescent, Henleaze, Bristol.

Merseyside Live Steamers

On March 6th some of the members gathered at a graveside to pay their last respects to the late Treasurer, Bill Lowther, one of the founders of the club. While Bill had been in failing health for some time, his death was a shock to all. A craftsman, a staunch friend, a likeable and unassuming fellow has passed on.

Fortnightly meetings will continue to be held at the Clubroom, 32, Ennismore Road, Fairfield, Liverpool 7, at 8.0 p.m. Next meeting Tuesday, April 2nd.

Hon. Secretary: A. F. DUCKITT, 145, Bowring Park Avenue, Liverpool 16.

NOTICES

The Editor invites correspondence and original contributions on all small power engineering and electrical subjects. Matter intended for publication should be clearly written, and should invariably bear the sender's name and address.

Readers desiring to see the Editor personally can only do so by making an appointment in advance.

All correspondence relating to sales of the paper and books to be addressed to Percival Marshall and Co. Ltd., Cordwallis Works, Maidenhead, Berks.

All correspondence relating to advertisements to be addressed to THE ADVERTISEMENT MANAGER, "The Model Engineer," Cordwallis Works, Maidenhead, Berks.

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SALES AND WANTS

Private: **Threepence** *word.* *Trade*: **Sixpence** *word.* *Use of Box* **2/6** *extra.*
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TOOLS & WORKSHOP

Buck and Ryan's Department for Lathes, Drilling Machines, Grinders, Electric Tools, Chucks, Surface Plates, Lathe Accessories and Tools.—310-312, Euston Road, London, N.W.1. Telephone: EUSton 4661. Hours of Business: 8.30 to 5.0 p.m., Monday to Friday; Saturday, 1.0 p.m.

Silver Steel Rounds, Squares, Asbestos Sheet, String, B.M. Steel Rounds, Squares, Angles, Flats, Brass Rounds, Squares, Flats, Hexagons, Sheets, Copper Tubes, Rounds, Squares, Sheets, Screws, Nuts, Drills, Taps, Dies, Rivets. S.A.E. for lists.—S. REED & SON, 89, Keresley Road, Coventry.

Split Chucks for Watchmakers Lathes, 6 mm., 6½ mm., and 8 mm., at 7s. each, postage 6d.—JOHN MORRIS, 64, Clerkenwell Road, London, E.C.1.

Clearance at Bargain Prices. Very useful surplus assortment Milling Tools, Drills, Taps, Gauges, etc. . All unused H.S.S. All on appro. Send stamped envelope for particulars.—Box No. 3913, MODEL ENGINEER Offices.

"Tool News" keeps you up-to-date. Specimen copy 6d., post free.—GARNERS, Sheffield Road, Barnsley.

Brazing Blowlamps. Five pint, £4 5s.; six pint, £6 5s. (flexible extension); Jacob 0-½" Drill Chucks, 32s. 6d.; 0-⅝", 24s. 6d.; 0-½", 19s. 6d.; Silver Solder, 46s. 6d. lb.; Copper Sheets, 2 ft. sq., 10-g., 50s.; 13-g. at 40s.; 16-g., at 30s. per 2 ft. square sheet; Woodturning Tools, set of six (handled), 25s.; "Wimet" tipped Lathe Tools, 9s. 6d. each, ¼", 5/16", and ⅜" shanks.—CORBETT'S (LATHES), Stanton Hill, Nr. Mansfield. 'Phone 583, Sutton-in-Ashfield. C.W.O. or C.O.D.

Wanted, Small Lathe, 2" preferable. Price and condition to—J. WHITEMAN, 33, Cedar Crescent, Easington Lane, Hetton le Hole, Co. Durham.

3⅛" Myford ½ H.P. Motor, 4-jaw Chuck, Drill Chuck, accessories, £30 or near.—67, Hillrise Avenue, Watford.

Wanted, Lathe and Accessories, 2⅛"-2½" Zyto, Portass, or similar.—SHERRIFF, 240, Hughenden Road, High Wycombe.

B.A. Thread Screws, one gross useful sizes, 2s. 6d.; ditto, nuts, 2s. 6d. gross; assorted gross screws and nuts, 2s. 6d.; ditto, brass washers, 1s. 6d. gross; fibre washers, 1s. 6d. gross; assorted soldering tags, 2s. gross; assorted small eyelets and rivets, 1s. 3d. gross. Large stock of screws, etc. State wants. Rubber-covered stranded copper wire, 1d., 1½d., 2½d. yard; Twin bell wire, 12 yards, 2s. 3d.; ditto, flat rubber-covered, 3d. yard; Cotton-covered copper instrument wire, ¼ lb. reels, 18, 20, 22, 24-g., 1s. 6d.; 26, 28-g., 1s. 9d.; 30, 32-g., 2s.; 34-g., 2s. 3d.; Enamelled ditto, same prices, including 36-g., 2s. 3d.; 38, 40-g., 2s. 6d.; Silk-covered ditto, 2-oz. reels, 24, 26, 28-g., 1s. 6d.; 30, 32, 34, 36-g., 1s. 9d.; 40, 42-g., 2s.; 16-g., 1 lb., 5s.; Laminated Bakelite panels, ⅛" thick, 6" × 4", 1s. 3d.; 6" × 6", 1s. 9d.; 8" × 6", 2s. 3d.; 10" × 6", 2s. 9d.; 10" × 8", 3s. 6d.; 12" × 8", 4s.; highly polished Ebonite panels, 3/16" thick, sizes as above, 1s. 9d., 2s. 9d., 3s. 6d., 4s. 6d., 6s., 7s. respectively. All postage extra. Trade enquiries invited.—POST RADIO SUPPLIES, 33, Bourne Gardens, London, E.4.

For Sale, Round Belt Flywheel and Treadle with ball race ends, £3 10s.; also Trickle Charger, 2 to 4 V., 200/250 V., carriage extra, 15s.—E. D. ALLEN, 2, Heidelberg Road, Southsea.

For Sale, Stand and Treadle for 3½" Drummond, £5, C.F.—SACKREE, 126, Featherby Road, Gillingham, Kent.

Small Wood-planing Machine, about 9", or combined planer and saw bench (Tyzack or similar) wanted immediately. New, or as new.—WHITSON, Stoneycroft, Newlands, Keswick.

ELECTRICAL EQUIPMENT

Brand New A.C. Motors, 200/250 volts, high starting torque, ¼ h.p., £5; 1/3 h.p., £5 10s. All sizes available:—JOHN STEEL, Bingley, Yorks.

Electradix Bargains include:

Dynamo and Motor Generator Bargains. G.E.C. double current Dynamos, 6 volts, 5 amps., 600 volts, 80 m.a., ball-bearings, 17 lb., as new, 37s. 6d., carriage paid, 5s. refunded on returned packing case.—Below.

Small D.C./D.C. Motor Generators by leading makers for use in Radio Receivers to take the place of H.T. battery, 6 volts input, 10 volts, 15 m.a. output, or 12 volts input, 230 volts, 30 m.a. output, £3 15s., weight only 5½ lb., size 5½" × 3½" × 3½", model finish, ball-bearings, 2-comms., 2 separate windings, waterproofed.—Below.

Transformers, 3 K.W. Crypto, 230 volts to 115 volts, 28 amps., £9 10s., to small Bell Transformers, 230/3/58 volts, 7s. 6d. Transformers for Rewind, 3 K.W. with stampings 4½" × 6" × 7½", windings damaged by blitz, weight with damaged wire, 65 lb., 45s., carriage extra.—ELECTRADIX, 214, Queenstown Road, London, S.W.8.

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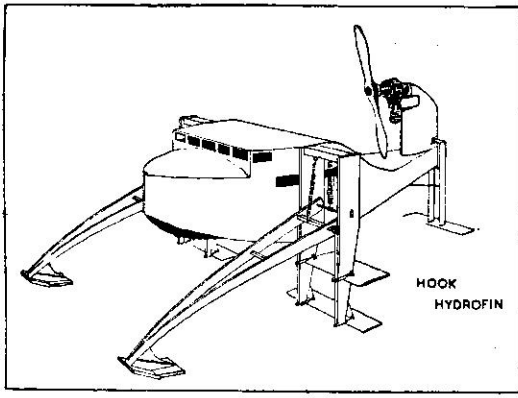

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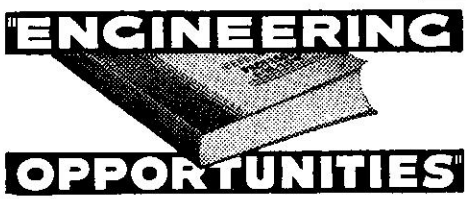

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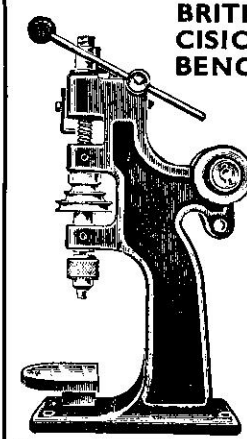

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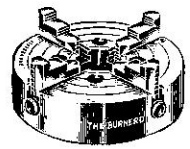

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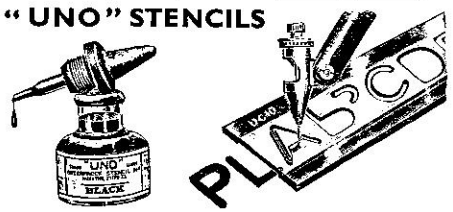

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